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A MANUAL OF GYNAECOLOGY
AND
PELVIC SURGERY

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A Manual of Gynæcology

AND

Pelvic Surgery

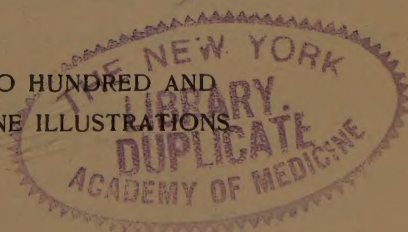
FOR
STUDENTS AND PRACTITIONERS

BY

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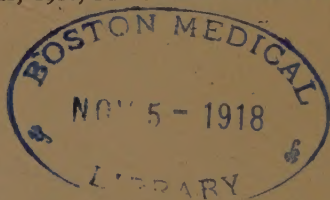
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PREFACE

This manual is intended to furnish a concise, practical working knowledge of gynæcology with especial emphasis upon diagnosis and treatment.

Much time has been devoted to the selection of references in the hope that the book may prove to be useful, not only to medical students, but to general practitioners and those who make gynæcology the greater part of their daily work.

The references bear no relation to the author's expressed opinions, but have been so selected as to indicate the thought of representative investigators and clinicians upon all the subjects dealt with, and a sufficient number has been included to enable the reader, by their systematic use, to gain a comprehensive knowledge of every phase of the subject.

They will also serve as the author's acknowledgment of indebtedness to those writers whose opinions, methods, etc., he may have copied either consciously or unconsciously.

The book references are intended for collateral reading by students for whom journal articles and society transactions may not be available.

Every endeavor has been made to treat the subject of gynæcology as it really exists, viz., as a highly specialized branch of general surgery bearing a close relationship to obstetrics, and demanding a thorough knowledge of general medicine for a proper appreciation of its relative importance in the medical field with its multiplicity of specialties.

The chapter on Anatomy was prepared by Dr. A. J. Skeel, Obstetrician to St. Luke's Hospital, Cleveland, Ohio.

The micro-photographs are by Dr. C. V. Keller, Instructor in Pathology in the University of Michigan.

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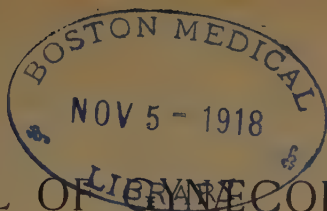
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MANUAL OF GYNECOLOGY

CHAPTER I

ANATOMY

A definite knowledge of anatomy is necessary for the proper understanding not only of gynæcologic surgery, but also of symptomatology and the extension of disease processes. The reason why pain in one locality may be due to inflammatory disease or malignant infiltration in another is readily explained by the peripheral nerve distribution from a common nerve trunk, or a close association between the nerve centers governing both regions. The route of extension from a distal focus of infection of trivial character, to a proximal location whose invasion jeopardizes life is appreciated through a knowledge of the continuity of surfaces, lymphatic distribution, or venous return from the original atrium of infection.

In the present chapter an attempt is made to review the salient points in the anatomy of the parts concerned in gynæcology, and to make the review sufficiently full and accurate to serve as a ready reference upon any obscure points of practical importance. Since originality in descriptive anatomy is obviously impossible, no apology is intended in stating, that that which follows is largely but a condensation from accepted authorities. The English translation of the B.N.A. is used except where the Latin forms have been Anglicized by common usage or where the use of Latin terms makes the diction smoother. The older terminology is placed in parenthesis whenever the newer seems in danger of being misunderstood by reason of its wide deviation from the earlier anatomical terms.

THE EXTERNAL GENITALIA

In the description of the external genital parts the subject is presumed to be in the lithotomy position in which there are visible the vulva, the perineum, and the anus.



FIG. 1.—External genitals of female. (*After Morris.*)

THE VULVA

The vulva, or pudendum, is a term used to designate that part of the female sexual apparatus external to the vaginal

orifice. It comprises the mons pubis, the labia majora, the posterior commissure, the labia minora, the clitoris, the vestibule of the vagina, and the external orifice of the urethra. In nulliparæ the hymen is present, either ruptured or intact, and after labor its remnants are found as the hymenal caruncles.

The *mons pubis* consists of a thick pad of fat and connective tissue overlying the os pubis. It is covered with skin from which springs a thick growth of coarse hair arranged in the form of a triangle with its base upward. Extending posteriorly from the mons pubis, one at either side of the pudendal slit, are two large folds of integument from 7 to 8 cm. in length known as the *labia majora*, whose outer surfaces are pigmented and covered with a growth of hair continuous with that over the mons pubis. On their inner surfaces, where they are in contact, their skin is more delicate and they are supplied with sebaceous glands.

The posterior ends of the labia majora unite about 3 cm. anterior to the anus, their point of junction being known as the posterior commissure or fourchette.

Each labium majus contains a dense layer of connective and adipose tissue in which is a rich plexus of veins. In its anterior end is found the external termination of the uterine round ligament which here frays out and blends with the connective tissue of the labium. The fissure between the labia majora is known as the pudendal slit, and in the lithotomy position this appears as a vertical cleft while in the erect position it is horizontal.

The *labia minora* consist of delicate folds of integument containing connective tissue and but little fat. They lie internal to the labia majora and may be considered as arising at the junction of the posterior one-third with the anterior two-thirds of the latter structures. From here they extend anteriorly to the clitoris where they divide into two portions. The anterior or larger division passes over the clitoris to form its pre-

puce while the posterior or smaller unite to form its frænum. The labia minora are pink in color, have few or no hairs upon their surface, and are richly supplied with nerve filaments. They contain sebaceous glands opening both upon their internal and external surfaces.

The *clitoris* is the homologue of the male penis and like the latter is erectile. It is about 3 cm. in length and situated immediately beneath the junction of the anterior division of the labia minora. The clitoris consists of a glans or head, a corpus or body, and two crura or roots. The glans covers the distal extremity but it is not penetrated by the urethra as it is in the corresponding male organ.

The body is made up of two corpora cavernosa as in the male penis, the corpus spongiosum of the latter being represented by the vestibular bulbs which may be considered as two halves of a split corpus spongiosum which connect anteriorly with the erectile tissue of the clitoris.

The *vestibular bulbs* are pyriform in shape, their larger extremities extending posteriorly nearly to the posterior commissure, thus partially surrounding the vaginal orifice, while the corpora cavernosa are attached to the pubic rami and form the crura of the clitoris.

The *vaginal vestibule* is the area lying between the labia minora superior to the vaginal orifice. In the mid-line of the vestibule posteriorly is the external urethral orifice which lies from 1 to 1½ cm. below the pubic arch. This orifice is from 4 to 5 mm. in diameter and on its vaginal margin has a slight prominence marking its position. The para-urethral ducts (Skene's glands) are found, one at either side, opening either just within or just without the meatus. In addition there are a number of shallow follicles opening upon the mucous surface of the vestibule in the same locality.

The *larger vestibular glands* (Bartholin's glands) open one on either side of the vaginal orifice a little posterior to a line drawn

transversely across its middle, the orifice of the duct lying between the hymen and labia minora.

The *hymen* is a fold of mucous membrane which partially occludes the vaginal orifice, and it contains connective tissue and blood-vessels between its layers. It is usually crescentic in form with the concavity anteriorly, but it may be annular, cribriform, or wholly imperforate, in the latter event entirely occluding the vaginal orifice. This membrane is so delicate that ordinarily it is ruptured at the first intercourse or even by vaginal examination, but occasionally it persists until after the first labor.

THE PERINEAL REGION

The *perineal region* is a lozenge-shaped area whose anterior angle is at the sub-pubic ligament, its posterior at the tip of the coccyx. The lateral angles are at the ischial tuberosities. It will be noticed that this area is perforated by three orifices, the external urethral, the vaginal, and the anal, and it is not to be confounded with the small "perineal body" which lies between the anus and the vaginal outlet.

A line connecting the ischial tuberosities lies about 2 cm. anterior to the anus and divides the perineal surface into anterior and posterior triangles. In the mid-line of the posterior triangle is seen the external anal orifice. In the anterior triangle are found the urethral and vaginal orifices.

The blood supply of the vulva and perineum is derived from the external and internal pudendals (pudics). The internal pudendals pass deeply along the ischial and pubic rami giving off numerous superficial branches in their course. Branches from the internal pudendal supply the corpora cavernosa, the bulbi vestibuli, and the labia. The veins correspond to the arteries. The inferior hemorrhoidal vessels supply the skin of the posterior anal triangle. The lymphatics of the two sides communicate anterior and posterior to the vaginal orifice and terminate in both the femoral and inguinal lymphatic glands,

hence the appearance of inguinal and femoral lymphadenitis in connection with infections about the vulva.

The superficial nerves are derived from the inferior pudendal, the inferior hemorrhoidal, and the superficial perineal.

Midway between the anus and the vaginal orifice is the *central*

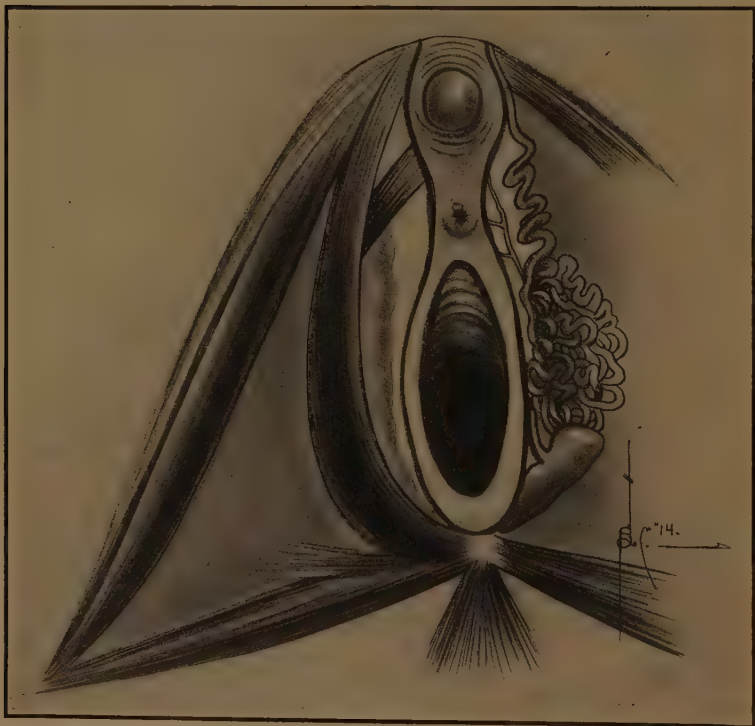


FIG. 2.—Diagrammatic representation of the female perineal structures.
(After Morris.)

point of the perineum at which the various fascial layers of the region unite, and two of the paired, the bulbo-cavernosi and transversus perinei, and one of the single superficial perineal muscles, the external sphincter ani, are attached at this point.

The bulbo-cavernosus arises from this point in the perineum and passes anteriorly as a muscular band about 2 cm. in width,

lying lateral to the vaginal orifice and external to the greater vestibular gland and vestibular bulb. Anterior to these the muscle separates into three bundles for insertion: (a) as an external set which attaches to the pubic rami and the fibrous tissue of the corpus cavernosum; (b) a median set, the constrictor radices clitorides, crossing and constricting the crus of the clitoris and terminating in its suspensory ligament; and (c) an internal bundle which is inserted into the anterior vaginal wall between the clitoris and external urethral orifice.

The nerve supply is furnished by the pudendal through its superficial perineal branches.

The *transversus perinei superficialis* is a bundle of fibers taking origin from the inferior (ascending) ramus of the ischium and the base of the uro-genital trigone. It passes transversely to its insertion at the central point of the perineum where some of its fibers interlace with those of the external sphincter ani. It is supplied by the superficial perineal branch of the pudendal nerve.

The *sphincter ani externus* is an ellipse-shaped muscle which encircles the anal canal. It is composed of superficial and deep portions. The sphincter ani superficialis takes its origin from the dorsal aspect of the last piece of the coccyx passing anteriorly to the anus, where it divides into two lateral halves which encircle the lowermost extremity of the anal canal and unite at the central point of the perineum. The deep portion of the external sphincter is more nearly circular, is not attached to the coccyx, and blends above with the pubo-rectal fibers of the levator ani. Most of the fibers terminate in the central point of the perineum, but some of them decussate anterior to the anus and are attached to the inferior ramus of the ischium of the opposite side. Superficially the external sphincter is in relation with the skin, mesially with the wall of the anal canal. The anus may be forcibly occluded by voluntary contractions of the muscle and its tonic contraction assists in keeping the anus constantly closed. Its nerve supply is de-

rived from the pudendal and muscular branch of the fourth sacral.

The *ischio-cavernosus* (erector clitoridis) muscle surrounds the crus of the clitoris. It extends along the ischio-pubic ramus from the ischial tuberosity to the clitoris, its fibers arising from the tuberosity of the ischium and the ischio-pubic ramus and inserting by a tedious expansion into the surface of the crus.

The *sphincter urethræ membranaceæ* (compressor urethræ) consists of two portions, a sphincter proper of the urethra, and a supporting portion which blends with the layers of the uro-genital trigone.

The sphincter portion arises from the fibrous tissue above the urethra and behind the symphyseal surface of the pubis, and passing around the urethra on either side is inserted into the fascia between the urethra and the anterior vaginal wall.

The supporting portion of the muscle consists of fibers running transversely in a thin layer between the fascial planes of the uro-genital trigone. They arise largely from the inferior rami of the pubes and are inserted in the mid-line (*a*) above the urethra, (*b*) beneath the urethra, and (*c*) into the vaginal wall. Many unstriped fibers are found in the substance of this muscle.

The *transversus perinei profundus* lies posterior to the sphincter of the membranous urethra but in the same plane between the fascial layers of the uro-genital trigone. Its fibers arise from the ischio-pubic rami and pass mediad to be inserted in the mid-line both anterior and posterior to the vagina.

FASCIA

The fascia of the perineal region consists of four layers, the two more superficial being made up of two layers of the superficial perineal fascia. The superficial layer of the superficial fascia is of no importance since it is continuous with the general superficial fatty fascia of the body.

The *deep layer of the superficial fascia* is of more importance. Externally it is attached to the margin of the ischio-pubic rami

and tuberosity of the ischium. Anteriorly it is continuous with the fascial covering of the clitoris. As it passes posteriorly, it is pierced by the vaginal orifice, and posterior to the vaginal orifice it covers the transversus perinei superficialis and then turns upward behind it to unite with the deep and superficial layer of the uro-genital diaphragm (triangular ligament), together with which it forms the posterior limit of the deep and superficial interspace. Between this fascia and the superficial layer of the uro-genital diaphragm are found the superficial transversus perinei, the ischio-cavernosa, and the bulbo-cavernosa muscles, the crura clitoridis, the vestibular bulbs, the greater vestibular glands, the arteries, veins and lymphatics of the clitoris, the superficial perineal vessels and nerves, and the perineal branches of the posterior femoral cutaneous (small sciatic) nerves. The space containing these structures is known as the superficial or inferior perineal space.

The *inferior fascia of the uro-genital diaphragm* (superficial layer of the triangular ligament) forms the deep boundary of the superficial interspace just described. It consists of transversely arranged fibers attached to the ischio-pubic rami on either side, runs directly across the pubic arch, and extends as far posteriorly as the perineal shelf where it unites with the deep layer of superficial fascia and superior fascia of the uro-genital diaphragm. In the female this layer is pierced by the vaginal orifice and it attaches to the vaginal walls near the introitus. Anteriorly it assists the superior layer and sphincter of the urethra in supporting and fixing the urethral and vaginal walls. Between this layer of fascia and the superior layer of the uro-genital diaphragm is the so-called superior perineal interspace in which are found the sphincter of the membranous urethra and the deep transverse perineal muscles, the internal pudendal arteries and veins, pudendal nerves and lymphatics, and the dorsal nerves of the clitoris. The perineal vessels and nerves pierce this fascia near its base to enter the superficial inter-space.

The pudendal vessels and nerves are the terminal portions

of those structures and lie in a groove close to the ischio-pubic rami, their ultimate termination being the dorsal vessels and nerves of the clitoris. The arteries to the vestibular bulbs pass transversely mediad from their origin in the internal pudendals, pierce the inferior layer of the fascia of the uro-genital dia-



FIG. 3.—Section of the female pelvis. "Perineal body is not wedge-shaped." (After Spalteholz.)

phragm, and enter the bulbs. The vessels to the clitoris pass through a small space immediately beneath the sub-pubic arcuate ligaments.

The *superior fascia of the uro-genital diaphragm* (deep layer of triangular ligament) might be described as a continuation

of the obturator fascia interrupted by its attachment to the ischio-pubic rami. Like the inferior fascia it spreads across the pubic arch and is pierced by the vaginal passage and urethra. It forms the superior boundary of the superior perineal interspace and extends posteriorly to unite with the other fascial layers of this region at the perineal ledge or shelf where it helps to form the posterior boundary of these interspaces.

The *perineal body* of the female is formed by a heavy development of the perineal ledge which is produced through the fusion of the three layers of fascia above described, together with the superficial transverse perineal muscles, the posterior fibers of the deep, and a very few fibers of the levator ani. The perineal body is broad at its base, which is the skin surface, and extends from the posterior commissure to the anterior border of the anus. Superiorly it ends in a wedge about 3 cm. from the surface, the wedge terminating in a thin fascial layer which separates the posterior vaginal wall from the anterior wall of the rectum. Just above the level of the internal anal sphincter the perineal body in the living subject presents a forward curve of its posterior surface which probably is due to the tonic contraction of the levator ani muscles, the result of which is to destroy the usual anatomical conception of the perineal body as a wedge with its base downward.

THE PELVIC DIAPHRAGM (Pelvic Floor)

The pelvic diaphragm closes in the lower end of the abdomino-pelvic cavity, its principal component parts being the coccygeus and levator ani muscles with the fascia covering them.

The *coccygeus* is in direct relation with the anterior border of the pyriformis. It arises from the spine of the ischium, the border of the sacro-sciatic notch, and the sacro-spinous ligaments, and spreads out to become attached to the sides of the lower sacral and upper coccygeal vertebræ. The distended rectum is in contact with its visceral surface.

The *levator ani* forms the greater portion of the muscular

pelvic diaphragm and really is composed of two separate muscles, an anterior, the pubo-coccygeus, and a posterior, the ilio-coccygeus. Each of these arises from the pelvic wall and both are covered on their superior or visceral surfaces by the endo-pelvic fascia. The posterior portion, or ilio-coccygeus muscle, takes its origin from the tendinous arch of the levator ani muscle (white line of the pelvis) which extends from the

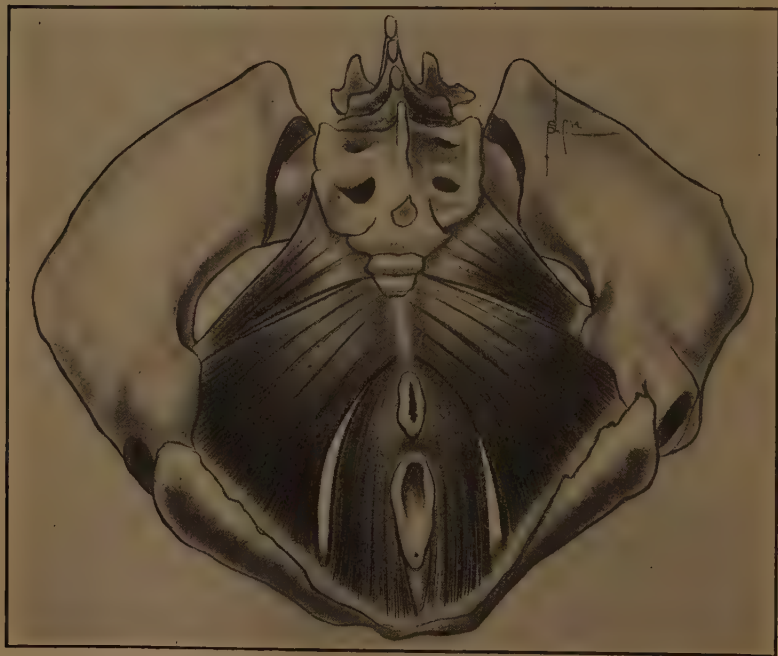


FIG. 4.—Pelvic diaphragm seen from below and behind. (After Morris.)

posterior surface of the os pubis to the spine of the ischium. The muscle fibers extend in a thin sheet posteriorly and medially, the muscles of the right and left sides meeting in the mid-line between the tip of the coccyx and the anus, the most posterior fibers being inserted into the coccyx. This bundle of fibers is slight and of less importance than the anterior.

The *pubo-coccygeus* takes its origin from the posterior surface

of the os pubis and from the anterior portion of the tendinous arch of the levator ani. Its fibers pass inferiorly, posteriorly, and mediad, lateral to the vagina and rectum, joining their fellows of the opposite side in the median line posterior to the anus. A few of the fibers are attached to the rectal wall, and a small slip joins the median raphe anterior to the anus

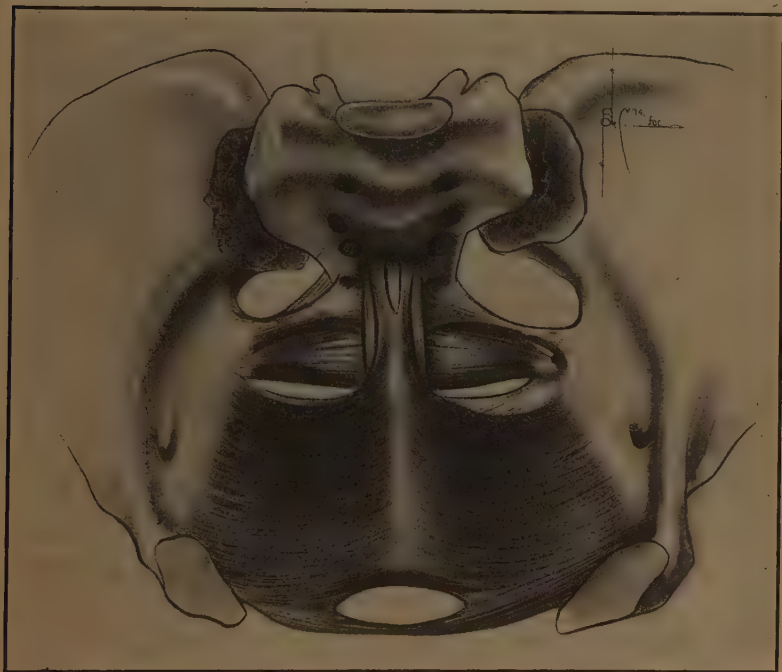


FIG. 5.—Pelvic diaphragm seen from above after removal of rectum and separation of pubic bones. (*After Morris.*)

uniting with the external sphincter ani and central tendon of the perineum. The few fibers which join the central tendon of the perineum correspond to the slip which surrounds the prostate of the male.

The anterior borders of the pubo-coccygei leave a narrow triangular interval between them, with its apex posteriorly. The anal canal lies at the apex of this space just anterior to

the junction of the two muscles, while the vagina and urethra pass through the wider anterior portion of the interval. The pubo-coccygei therefore lie lateral and posterior to the vagina near its outlet and are subject to over-distension and laceration during labor. When the pubo-coccygei contract, the upper ends remain so fixed by their attachments that the shortening of the muscles diminishes the concavity of the sling which they form by their junction behind the anus. This action raises the diaphragm upon which the pelvic viscera rest. It also lifts the anus upward during defecation, and at all times supports the anal canal and vaginal outlet thus keeping them in their normal location in relation to the pubic arch.

The levator ani is supplied by the third or fourth sacral and sometimes by both.

The coccygeus muscle is supplied by the fourth and fifth sacrals which form a plexus on its anterior surface.

A careful consideration of the muscles and fascia of this region explains why a *median* laceration of the pelvic diaphragm is unimportant so long as it does not include the external sphincter ani, the muscles involved being so insignificant that no deleterious result follows, while a tear in the lateral sulci deprives the anal and vaginal outlets of their normal support and allows the latter to gape widely. In making a vaginal examination upon a patient with an injured pelvic diaphragm, the sling formed by the superficial margin of the levator muscles is readily felt, while it is conspicuous by its absence when these muscles have been injured. The severe hemorrhage which follows a deep injury to the lateral and superior margins of the vaginal orifice is explained by the location of the vestibular bulbs, and the occasional occlusion of the ducts of the vestibular glands by a poorly performed perineorrhaphy is easily understood.

THE VAGINA

[The vagina is a tubular canal which extends from the introitus upward and backward to terminate by encircling the neck of

the uterus about midway between its external and internal orifices. Its anterior wall is from 7 to 8 cm. and its posterior 8 to 10 cm. in length.

The vaginal introitus is rather firmly fixed and is relatively inelastic because of the attachments of the perineal and urogenital layers of fascia, but above this the walls are elastic and very distensible. Normally the anterior and posterior walls



FIG. 6.—Female organs of generation (modified from Sappey) vagina opened from behind. Posterior view. (*After Morris.*)

of the vagina are in contact with each other while the lateral walls are some distance apart, a section at right angles to the long axis of the vagina showing the vaginal canal as a transverse slit, each end of the slit having an anterior and posterior diverticulum so that the section in its entirety represents the letter H. The long axis of the vagina forms an angle of thirty degrees with the long axis of the body.

At its upper end where the vagina encircles the cervix, the

greater length of the posterior vaginal wall is explained by its attachment 3 cm. higher than is the anterior wall.

Anteriorly in the mid-line is a marked longitudinal column, the rugarum anterior, while the posterior wall presents a similar but less distinctly marked structure.

From both these columns transverse folds, the rugæ vaginales, pass laterally toward the sides of the vagina. These folds and columns are permanently smoothed out during labor so that they are less distinctly marked after this event. The upper end of the vagina is divided into anterior, posterior, and lateral fornices by the projecting cervix.

RELATIONS OF THE VAGINA

Anteriorly the lower portion of the vaginal wall is in relation with the urethra, its middle and upper portions with the base of the bladder and ureters. Posteriorly the lower portion is separated from the anal canal by the perineal body, the mid-portion is in relation with the rectum, and the upper portion for 1 to 2 cm. is in relation with the recto-uterine excavation. The lateral vaginal walls are in contact with the vaginal bulbs inferiorly, their middle one-third lies just mediad to the levator muscles, and at the upper third of each is the ureter running obliquely outward across the lateral vaginal wall of the corresponding side. The vaginal arteries and veins also lie in contact with the lateral vaginal walls. Superior to the lateral vaginal fornices are found the broad ligament bases which contain the uterine vessels and ureters and the connective tissue of the parametrium.

The *coats of the vagina* are mucous, muscular, and fibrous. The mucous coat is lined by stratified squamous epithelium, is devoid of glands, and more nearly corresponds to a cutaneous than a mucous surface. The muscular coat is thin and is composed of unstriped fibers continuous with those of the uterus. The outer coat is made up of elastic fibrous tissue derived from the endo-pelvic fascia.

The blood supply is from three sources. The upper end is supplied by vaginal branches of the uterines, the mid-portion



FIG. 7.—Horizontal section of vagina and adjacent structures.
(After Henle and Morris.)

from the inferior vesicals, and the lower from the middle hemorrhoidal and pudendal. The veins form a plexus external to

the vaginal walls and terminate in the hypogastrics. The nerve supply comes from the hypogastric plexus, the fourth sacral, and the pudendal.

The *female urethra* corresponds to the proximal portion of the male urethra and is about 4 cm. in length, extending from the apex of the vesical trigone to the external urethral orifice. It has an average diameter of 7 mm., its widest portion being about the middle, its narrowest at the external orifice.

Its mucous coat is thrown into longitudinal folds giving it a corrugated appearance. The mucous coat possesses many small tubular glands especially in its upper portion. External to the mucous coat is a muscular coat composed of a circular and longitudinal layer. At the vesical orifice the circular fibers are strongly developed into a bundle which constitutes the vesical sphincter. The lower portion of the urethra is firmly fixed by its attachments to the anterior wall of the vagina and the fascial layers of the uro-genital trigone. The mid-portion is less strongly attached and so sags slightly posteriorly.

THE RECTUM

The rectum is from 10 to 12 cm. in length and begins at the distal termination of the pelvic colon at the level of the middle of the third sacral vertebra. It is distinguished by the absence of a mesentery. From its origin the proximal portion extends downward and terminates in the anal portion where the intestine pierces the pelvic diaphragm. Superiorly the rectum lies on the anterior surface of the sacrum and coccyx. Inferior to the coccyx it lies on the muscular diaphragm.

At the proximal end of the rectum the peritoneal coats separate from the posterior rectal wall until this is uncovered; then the lateral walls become bared leaving only the anterior surface covered. About $2\frac{1}{2}$ cm. above the point where the intestine pierces the pelvic diaphragm the peritoneum folds forward from its anterior wall to the posterior wall of the upper end of the vagina, thence upward on the posterior surface

of the uterus. Below the level at which this fold leaves the rectum the bowel has no peritoneum. The rectum presents three dilatations or sacculi of which the largest is the ampulla just above the levator ani. The folds of mucous membrane and circular muscle which separate the sacculi have given rise to much discussion as the valves of the rectum.

The *anal part* of the rectum is from $2\frac{1}{2}$ to 4 cm. in length and extends from the levator ani muscles to the anal orifice. It is compressed by four muscles, the external sphincter ani lying inferiorly. In immediate proximity to this is the internal sphincter which consists of a considerable thickening of the circular muscle fibers of the intestine itself and is an intrinsic portion of its wall. The two levator ani muscles compress the bowel laterally just proximal to the level of the internal sphincter. The direction of the rectum as it approaches the pelvic diaphragm is well anteriorly, but it turns sharply backward as it passes through this, and the anal portion extends downward and backward to its termination at the muco-cutaneous margin which marks the anal orifice.

In the upper portion of the anal canal are found numerous vertical folds of mucous membrane which contain an artery and a vein. These are the rectal columns of Morgagni, and the veins in the lower portion of these columns and the area just inferior to them constitute a sub-mucous venous plexus which is the pile-bearing area.

The lower ends of the rectal columns are connected by transverse folds of mucous membrane called the anal valves, at the level of which is the muco-cutaneous junction known as Hilton's white line.

The rectal blood supply is mainly from the superior hemorrhoidal artery which divides into lateral branches, one on each side of the rectum. The inferior portion of the rectum is supplied by the middle and inferior hemorrhoidal arteries also.

The inferior and middle hemorrhoidal veins anastomose freely with the superior hemorrhoidal, the latter terminating in

the inferior mesenteric which is part of the portal system, hence the connection between hepatic congestion and hemorrhoids.

The cerebro-spinal nerves of the rectum are derived from the second, third, and fourth sacral; the sympathetics from the inferior mesenteric and pelvic plexuses. The anal skin is supplied by the inferior hemorrhoidal branch of the pudendal nerve.

The skin and muco-cutaneous junction of the anus drain into the inner set of inguinal lymph glands as does the perineum.

The rectum is drained by a system of lymphatics which end in the ano-rectal nodules along the walls of the rectum following the course of the superior hemorrhoidal vessels, and in the lateral sacral nodules on the anterior surface of the sacrum, all eventually terminating in the common iliac lymph glands.

THE PELVIC BASIN AND CONTENTS

On viewing the superior opening of the small pelvis from above, there are found the following structures at its circumference. Beginning at the mid-line anteriorly the fundus of the bladder extends to a point at or just below the crest of the pubes. Lateral to this and just internal to the pubic tubercle (spine) is the round ligament of the uterus running over the pubic pecten or crest to terminate in the labium majus. The base of the subcutaneous inguinal ring (external inguinal ring) is noted at this point. External to the pubic tubercle and extending from the inguinal ligament (Poupart's ligament) superficially, to be attached by its deep or posterior border, is the lacunar ligament (Gimbernat's ligament) whose apex is at the pubic tubercle, its base at the internal boundary of the femoral (crural) ring with the femoral vein in close apposition. Passing further laterally the ilio-psoas muscle overlaps the bony pelvic margin on its internal aspect. Upon the anterior surface of the muscle lie the external iliac artery and vein. On the left side the vein is internal and posterior to the artery

while on the right side the artery nearly covers it. The round ligament crosses the lower portion of the artery and lies anterior to it just before the ligament enters the abdominal inguinal ring (internal inguinal ring). On the left side, 3 to 5 cm. above



FIG. 8.—Pelvic inlet and female pelvic organs in a woman of forty who has borne children. (*After Edgar.*)

the level of the inguinal ligament, the ilio-psoas muscle and the iliac vessels are crossed by the iliac portion of the sigmoid colon where the latter turns downward over the ilio-psoas to become the pelvic colon. Still further around the bony circumference

of the inlet the external iliac vessels are crossed superficially by the ovarian artery and vein where the latter pass into the pelvis to enter the broad ligament.

Opposite the lumbo-sacral joint the common iliac artery terminates in the external iliac and hypogastric. At this point the ureter crosses superficially and lies on the anterior surface of the hypogastric artery as this passes downward in the pelvis. Still further posteriorly the superior hemorrhoidal artery crosses the common iliac artery and vein and passes downward into the pelvis to the left of the sacral promontory. The obturator nerve and lumbo-sacral cord pass deeply beneath the vessel to reach the pelvic cavity. Over the sacral promontory runs the middle sacral artery. The left postero-lateral portion of the pelvic brim is also covered by the mesentery of the pelvic colon which is attached by its roots on a line extending up the ilio-psoas muscle to the bifurcation of the common iliac, then down again over the sacral promontory. On the right side the terminal portion of the ileum overlaps the pelvic brim and covers the iliac vessels and the ilio-psoas muscle.

That portion of the small intestine beginning 2 to 4 meters from the duodenum and which possesses the longest mesentery, sometimes has some of its coils in the pelvic cavity, and it and its mesentery are superficial to and overlie all other structures at the posterior part of the circumference of the pelvic brim.

The peritoneum as a whole may be traced from the anterior abdominal wall as it passes downward over the intestinal surface of the bladder. Where the bladder and uterus come into relation at the level of the superior end of the cervix, the peritoneum is reflected upward over the anterior surface of the uterus, thus forming the vesico-uterine excavation. Laterally this layer of peritoneum forms the antero-inferior layer of the broad ligament. The peritoneum passes over the fundus and runs downward over the posterior uterine wall to and below its vaginal attachment, extending over the posterior vaginal wall for 1 or 2 cm. This layer extends laterally to form the postero-

superior layer of the broad ligament. After leaving the posterior vaginal wall the peritoneum is again reflected upward onto the rectum thus forming the recto-uterine excavation of Douglas. The lateral boundaries of this excavation are folds of peritoneum which on either side run from the corresponding side of the rectum. Within these folds are found the recto-uterine muscle (sacro-uterine ligament).

One gains a better conception of the relation of the pelvic viscera to the peritoneum by imagining all the former as supported in their proper positions by their true fibro-muscular ligaments, while the peritoneum has been draped from above like a loose sheet and tucked carefully around all the folds and into all the crevices. All the peritoneum-covered organs are developed outside their serous covering, and all remain outside the peritoneum excepting the ovary which has a modified endothelial outer covering but no distinct peritoneal coat. The above-mentioned folds of peritoneum comprise the false ligaments of the viscera, the true ligaments underlying them.

PELVIC CONTENTS

Having traced the structures at the pelvic inlet, its contents as a whole may be noted as they appear from above. It will be seen that the entire small pelvis is divided into anterior and posterior compartments by a transverse vertical partition consisting of the uterus and broad ligaments. This partition extends from one to the other lateral pelvic wall, and from about the level of the pelvic brim above to the pelvic diaphragm or floor below.

The uterus occupies the center of this partition with its fundus pointing antero-superiorly. The uterine tubes running laterally under the superior margin of the broad ligaments are visible at this time.

In the posterior larger compartment are seen loops of small intestine and the pelvic colon. Upon lifting out the small

intestine the posterior surface of the uterus and broad ligaments is exposed. Depending from each broad ligament is the ovary, which the uterine tube loosely encircles superiorly and externally. That portion of the rectum above the pelvic diaphragm is exposed and the recto-uterine excavation recognized, the latter bounded by the recto-uterine ligaments laterally, the peritoneal covered portion of the posterior vaginal fornix and uterus anteriorly, and the rectum posteriorly.

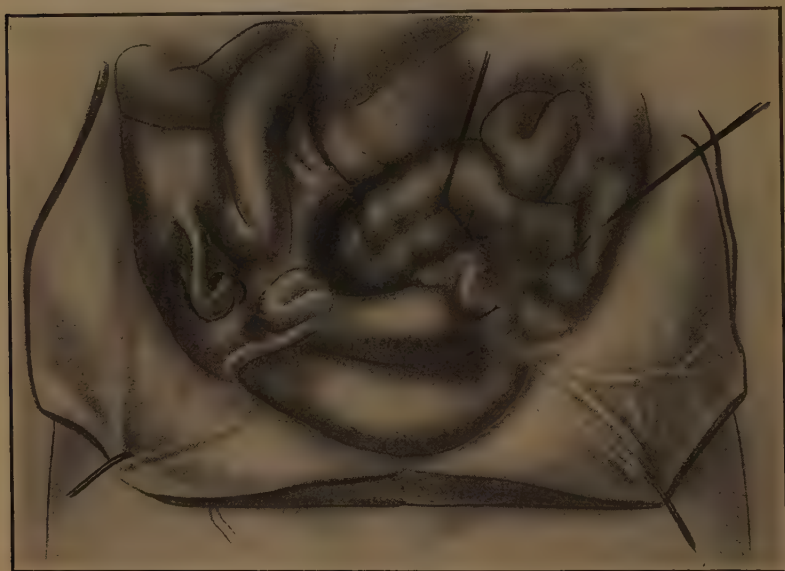


FIG. 9.—Pelvic contents seen from above. (*After Edgar.*)

The pelvic colon may be traced from above downward. Beginning at the pelvic margin, it passes obliquely downward and toward the right lateral pelvic wall, then loops backward and to the left to the mid-line, where opposite the third sacral vertebra it turns directly downward as the rectum.

The smaller anterior compartment contains the bladder and sometimes a few coils of small intestine. By tilting the uterus

backward its free mobility is noted and the fundus of the bladder can be seen. At the level of the reflexion of the peritoneum from the posterior bladder wall onto the uterus, the

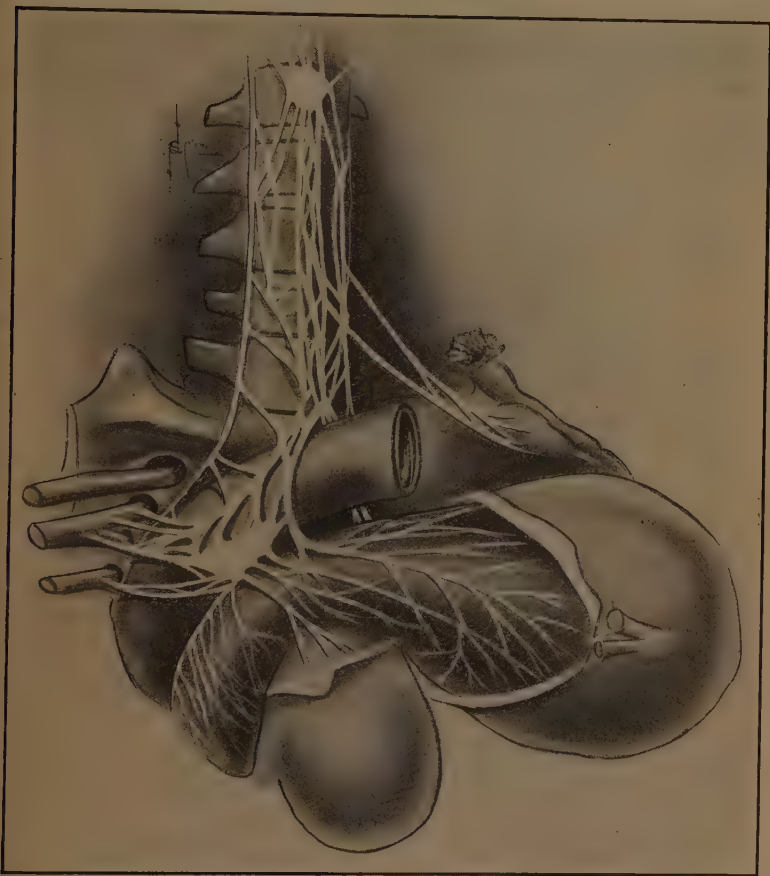


FIG. 10.—Nerve supply of female genital organs. (*After Edgar.*)

utero-vesical excavation is noted, bounded laterally by the utero-vesical ligaments.

The antero-inferior layer of the broad ligament is exposed and the ridge produced by the round ligament under it can be observed.

THE PELVIC CONTENTS CONSIDERED INDIVIDUALLY

THE UTERUS

The uterus is a thick-walled muscular sac formed by the fusion of the Müllerian tubes. It is lined throughout by a mucous coat and a part of its outer surface is covered by peritoneum. The uterus consists of two parts, a corpus or body and a cervix or neck, which are united by the isthmus.

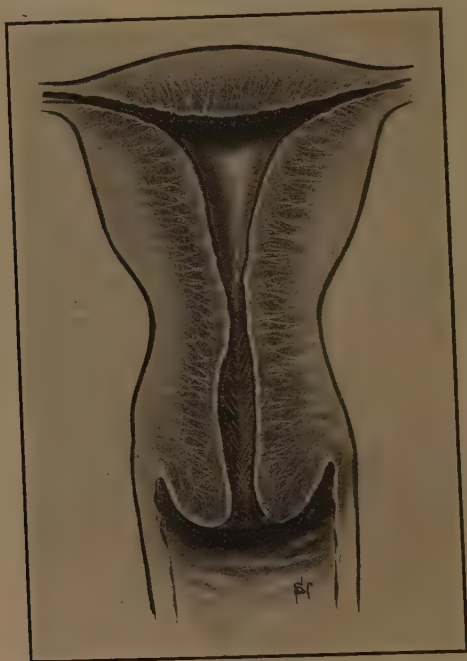


FIG. 11.—Sagittal section of nulliparous uterus. (After Edgar.)

The *corpus uteri* is entirely supra-vaginal. It has an antero-inferior or vesical surface and a postero-superior or intestinal surface. The vesical surface is relatively flat and completely covered by that layer of peritoneum which at the level of the isthmus is reflected onto the posterior surface of the bladder. As its name implies it looks forward and downward when the

bladder is empty. When the bladder is distended it looks directly anteriorly or even antero-superiorly.

The intestinal surface is convex and is covered by peritoneum which continues downward onto the posterior surface of the supra-vaginal cervix. Of the three margins, the superior is



FIG. 12.—Sagittal section of multiparous uterus. (*After Edgar.*)

known as the fundus, is convex, and corresponds to that portion of the body superior to the attachments of the uterine tubes.

The lateral margins extend downward from the entrance of the tubes and correspond to the space between the attachment of the two layers of the broad ligaments. The tubes, ovarian arteries, veins, nerves, and lymphatics all pass to and from the body of the uterus at its lateral margins between the layers of the broad ligament.

The *cervix uteri* comprises all that portion of the uterus inferior to the isthmus. In nulliparæ it constitutes about one-half the length of the uterus, while in women who have borne children its relative length is less and that of the body greater. The cervix pierces the vaginal vault obliquely backward and downward, the vaginal wall being attached to it in a line about 5 mm. in thickness.

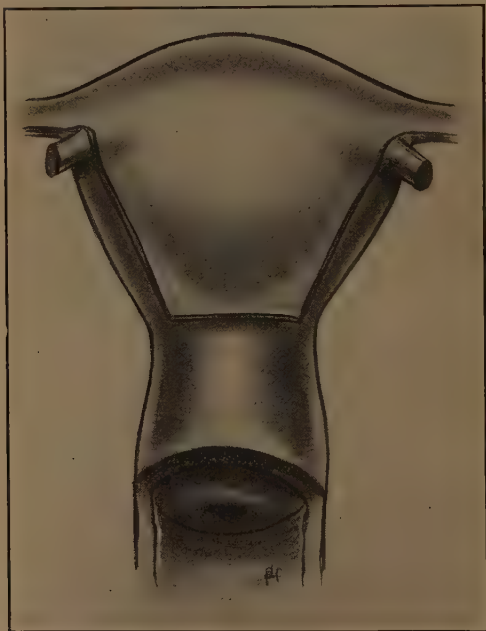


FIG. 13.—Anterior surface of nulliparous uterus. (After Edgar.)

That portion of the cervix superior to the line of the vaginal attachment is known as the supra-vaginal cervix; that portion projecting into the vagina as the portio-vaginalis or infra-vaginal cervix.

The anterior surface of the supra-vaginal portion has no peritoneal coat and is in relation with the posterior surface of the bladder to which it is loosely attached by connective tissue.

The posterior surface of the supra-vaginal cervix is covered by peritoneum and faces the recto-uterine excavation.

The infra-vaginal cervix points toward the posterior vaginal wall and the hollow of the sacrum. The posterior lip of the infra-vaginal cervix is longer than the anterior. Just above the vaginal attachment, upon either side of the posterior wall, is found the uterine attachment of the recto-uterine ligament.



FIG. 14.—Anterior surface of multiparous uterus.

The *cavity of the uterus* in the virgin is only a potential cavity the anterior and posterior walls of which lie in contact with each other.

The lower end of the cavity of the body of the uterus is separated from the cervical canal by a constriction at the internal orifice of the uterus (internal os). Below this the cervical canal presents a fusiform dilatation followed by a

second constriction at the external orifice (external os). In virgins the external orifice is nearly circular but in parous women it is a transverse slit. The entire uterine canal is about 6 cm. in length in nulliparæ and 7 cm. in multiparæ. Its greatest width is from 3 to 4 cm. The direction of the uterine axis is upward and forward from the external orifice, with an anterior concavity at the level of the internal orifice.

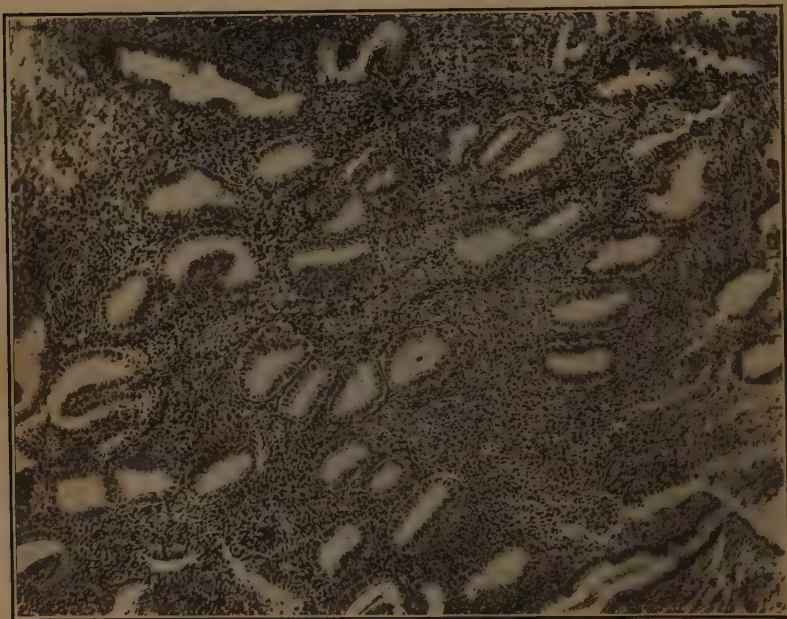


FIG. 15.—Normal endometrium. This section shows the normal proportion of glandular to interstitial. This corresponds fairly well with the description found in some text-books to the effect that the area between glands should equal that of the glands themselves.

The *coats of the uterus* from without inward are serous, muscular, and mucous. The serous coat at the lateral uterine margins is continuous with the peritoneal folds forming the broad ligaments.

The muscular coat is thick and constitutes the greater portion of the uterine wall. Roughly it is made up of three layers:

(a) a thick outer layer continuous with the muscle fibers of the uterine ligaments and tubes; (b) a middle layer which is the heaviest and whose fibers interlace in all directions but are grouped in small circular bundles about the internal uterine orifice and the uterine mouths of the tubes; (c) an inner layer of longitudinal fibers, many of which terminate in the cervix. These muscular layers can be separated in the pregnant uterus but are difficult to distinguish in the non-pregnant. The uterine mucosa is continuous above with that lining the tubes, and below with the stratified squamous vaginal epithelium covering the inferior end of the cervix. There is no submucosa, the mucous coat lying directly on the muscular and fitting the irregularities produced by the bundles of muscle fibers. The mucous coat lining the body of the uterus is smooth and pale and is known as the endometrium. It is lined with cylindrical ciliated epithelium and studded with straight tubular glands, some of which dip into the muscle underlying the mucosa.

The mucous coat of the cervical canal is thicker and denser than that of the body and possesses both tubular and racemose glands which secrete a glairy mucus.

The cervical lining is thrown into a series of ridges and intervening furrows known as the *arbor vitæ*. These correspond to the arrangement of the inner muscular layer and radiate laterally and upward from the median anterior and posterior lines.

The blood supply to the uterus is from the uterine and ovarian arteries, both of which anastomose with the artery of the round ligament.

The *uterine artery*, a branch of the hypogastric, runs between the layers of the broad ligament near its base and reaches the uterus at the level of the internal uterine orifice. Here it turns sharply upward giving off numerous branches in its course, and below the level of the uterine end of the tube it anastomoses with the ovarian. That portion of the uterine artery which runs upward along the lateral margin of the uterus is sometimes termed the *utero-ovarian*. It gives off numerous

branches which penetrate the muscular wall of the uterus by running between the bundles of muscle fibers and terminate just beneath the epithelium lining the mucous coat.

The *ovarian artery* is a branch of the abdominal aorta, and from the level of the pelvic brim it passes between the layers of the broad ligament near its upper margin, but inferior to the tube and ovary. The uterine veins are two or three in number and empty into the hypogastric. The veins accompanying the ovarian artery form the pampiniform plexus in the broad ligament and terminate in the ovarian vein. The cerebro-spinal nerves are derived from the third and fourth sacral, the sympathetic supply comes from the hypogastric plexus and forms a ganglion on the uterine artery where it crosses the ureter.

THE OVARY

The ovary is a pearly white almond-shaped organ which is suspended from the posterior surface of the broad ligament by the mesovarium. It averages 3 to 4 cm. in length, 2 to 3 cm. in width, and 1 to 1½ cm. in thickness. It has two surfaces, the lateral of which lies at the upper portion of the obturator internus muscle where there is present a depression known as the ovarian fossa. At the upper border of this fossa are the external iliac vessels, posterior are the ureter and uterine artery, while crossing its floor are the obturator vessels and nerve. The mesial surface of the ovary looks toward the uterus. The anterior or mesovarial margin looks forward and outward. The posterior free margin looks backward and inward toward the rectum. The outer part of the upper margin of the broad ligament (infundibulo pelvic ligament) extends from the upper extremity of the ovary to the pelvic brim as the suspensory ligament of the ovary.

From the inferior extremity of the organ the true ovarian ligament runs inward between the layers of the broad ligament to be attached to the uterus inferior to the tubes.

In the adult the ovarian surface is studded with vesicles, the vesicular ovarian follicles (Graffian follicles), and it presents numerous scars at points where previous follicles have ruptured.

The surface of the ovary is covered by a single layer of cuboidal cells which are continuous with the peritoneum of the mesovarium. Beneath this layer the connective-tissue stroma is thickened to form the tunica albuginea. The anterior attached margin of the ovary presents a gap between the layers of the mesovarium which is known as the hilum, and through which the ovarian vessels, nerves, and lymphatics pass.

The substance of the ovary consists of two portions. The outer, known as the cortex, contains the primary ovarian follicles and their mature forms, the vesicular ovarian follicles, which are embedded in a connective-tissue stroma. The central or medullary portion is richer in blood-vessels and is made up largely of loose connective tissue, with a few unstripped muscle fibers which are continued inward from between the layers of the mesovarium.

The ovarian artery, as it passes beneath the ovary, gives off branches which enter the ovary through the hilum. The veins from the ovary pass out through the hilum and unite with those of the pampiniform plexus to terminate in a single trunk as the ovarian vein.

The lymphatics of the ovary communicate freely with those of the uterus, an important anatomical fact which has a marked bearing on the development of ovarian abscess as the result of uterine infection. The ovarian and uterine lymphatics unite and accompany the ovarian vein, finally terminating in the lateral lumbar lymph glands.

THE UTERINE TUBES

The uterine tubes, from 9 to 12 cm. in length, extend outward from their point of junction with the uterus, and are contained within the peritoneal fold which forms the superior

margin of the broad ligament. All their coats are continuous with those of the uterus itself. Each tube consists of (*a*) a uterine portion extending through the uterine wall, (*b*) an isthmus or narrow medial portion, (*c*) an ampulla the dilated outer portion, and (*d*) an infundibulum or trumpet-shaped extremity. The infundibulum terminates in a series of processes known as fimbriæ, some of which come into contact with the posterior surface of the ovary over which the tube curves, partially encircling it. The tubal infundibulum opens into the free peritoneal cavity and thus establishes a communication between this cavity and the open air. That portion of the broad ligament which contains the tube and extends to the utero-ovarian ligament is known as the meso-salpinx. Between the layers of the broad ligament comprising the meso-salpinx run the vessels, nerves, and lymphatics of the tube, and vestiges of embryological structures known as the epo-oophoron and para-oophoron are found within it. The hydatid of Morgagni is a small cyst usually attached to one of the tubal fimbria. The narrowest portion of the lumen of the tube admits but a very fine probe and is found in the uterine part. The mucous coat is arranged in folds which are simple in their disposition at the isthmus but become more complex at the ampulla. There are no glands in the mucous coat, whose epithelium is ciliated and lies directly upon the muscular coat. Diverticula from the lumen sometimes occur while accessory tubes and secondary ostia are occasionally found.

External to the mucosa is found the muscular coat which consists of an inner circular and outer longitudinal layer. The tunica adventitia is a vascular connective-tissue coat which lies between the external muscular layer and the peritoneum, and is continuous with the sub-serous tissue of the broad ligament.

The peritoneal coat covers about four-fifths of the tubal circumference, that portion of the tube which corresponds to the attachment of the meso-salpinx having no serous covering.

The arteries come from the ovarian and uterine and freely anastomosing branches pass between the layers of the mesosalpinx. The veins correspond to the arteries.

The lymphatics accompany those from the fundus uteri and terminate in the lumbar lymph glands. The nerves are derived from the hypogastric plexus.

THE URINARY BLADDER

The urinary bladder is essentially a thin-walled, distensible, muscular sac, lined with mucous membrane and partially covered by peritoneum. When distended the female bladder is ovoid, its transverse diameter being greater than its vertical. When empty the superior surface becomes concave, the vesical cavity being reduced to a T-shaped fissure.

The distended bladder has a superior, anterior, posterior, and two lateral surfaces, the latter being somewhat indistinct. The anterior surface has no serous coat and extends from the urachus to the internal urethral orifice, looking downward and forward toward the pubis from which it is separated by the prevesical space filled with fatty connective tissue. The superior or intestinal surface is entirely covered with peritoneum and looks upward toward the abdominal cavity. The line of demarcation between the superior and anterior surface is a transverse line drawn through the vesical extremity of the urachus, but there is no distinct division between the superior and posterior faces. The posterior or uterine surface extends downward to the internal urethral orifice, there uniting with the anterior surface. The upper portion of the bladder is covered by peritoneum and corresponds to the vesico-uterine excavation. The lower portion of the posterior surface has no serous investment, and is attached to the anterior face of the supra-vaginal cervix and anterior vaginal wall by a thin extension of the endo-pelvic fascia. The upper portion of the lateral surfaces is covered by peritoneum, the lower by fatty connec-

tive tissue bearing the vesical vessels and nerves and separating the bladder from the levator ani muscles.

The ureters enter the bladder wall at the junction of its posterior and lateral surfaces. They pass obliquely through the vesical wall for about 2 cm. before terminating in the ureteral orifices, one on either side at the superior angles of the vesical trigone. The completely distended bladder may rise as high as the umbilicus but ordinarily the vesical fundus does not extend above the superior margin of the pubis. When the bladder is over-distended, the anterior portion of the superior surface looks anteriorly so that the anterior wall viewed in over-distension is not covered and lies directly in contact with the anterior abdominal wall. The urachus and obliterated foetal portion of the hypogastric arteries are known as the middle and lateral umbilical ligaments respectively.

Strands of the endo-pelvic fascia pass from the bladder to the pubis and are known as the middle pubo-vesical ligaments. Laterally, strands of the same fascia pass from the bladder to the tendinous arch of the levator ani muscles upon either side and these are known as the lateral pubo-vesical ligaments. On the posterior surface two thickened folds of connective tissue passing one on either side of the mid-line are termed the vesico-uterine ligaments. In the infant the bladder occupies a position relatively higher than in the adult, the internal orifice of the urethra lying behind the crest of the pubes.

The *interior of the bladder* shows a pale pink mucosa, which, except at the trigone, is folded into numerous rugæ when the bladder is empty and smoothed out when it is distended.

The mucosa of the trigone is at all times smooth and pinker in color than that lining the remainder of the bladder. The outline of the trigone is readily seen, a transverse ridge lying between the ureteral orifices marking its base while its apex lies at the internal urethral orifice. The ureteral orifices are situated at the summit of the ureteral papillæ. Projecting obliquely backward and outward from each papilla is another

distinct ridge which marks the course of the ureters through the bladder wall.

The peritoneal and mucous coats already mentioned cover the muscle wall, each being separated from the latter by a layer of areolar tissue which forms the sub-serous and sub-mucous coats respectively. The muscle wall is composed of three layers, an internal and external longitudinal and a middle circular. The circular layer makes up the greater portion of the entire thickness of the bladder wall and at the internal urethral orifice it forms the vesical sphincter.



FIG. 16.—Anterior portion of internal surface of the pelvis. Showing middle pubo-vesical ligaments. (*After Edgar.*)

The chief blood supply of the bladder is obtained from the superior and inferior vesical branches of the hypogastrics. The middle hemorrhoidal, vaginal, and uterine arteries give off some small branches which reach the bladder wall. The veins form large plexuses on the external surface of the muscular wall of the bladder and terminate in the hypogastrics. The lymphatics anastomose freely beneath the mucous coat, are especially well developed near the internal urethral orifice, and drain into the hypogastric lymph glands.

The cerebro-spinal nerves are from the third and fourth sacral, the sympathetics from the hypogastric plexuses.

THE URETERS

The exact course of the ureters is of the utmost importance in pelvic surgery. Each ureter crosses the bifurcation of the common iliac vessel of its own side, passes over the pelvic brim near the sacro-iliac joint, and enters the pelvis lying on the

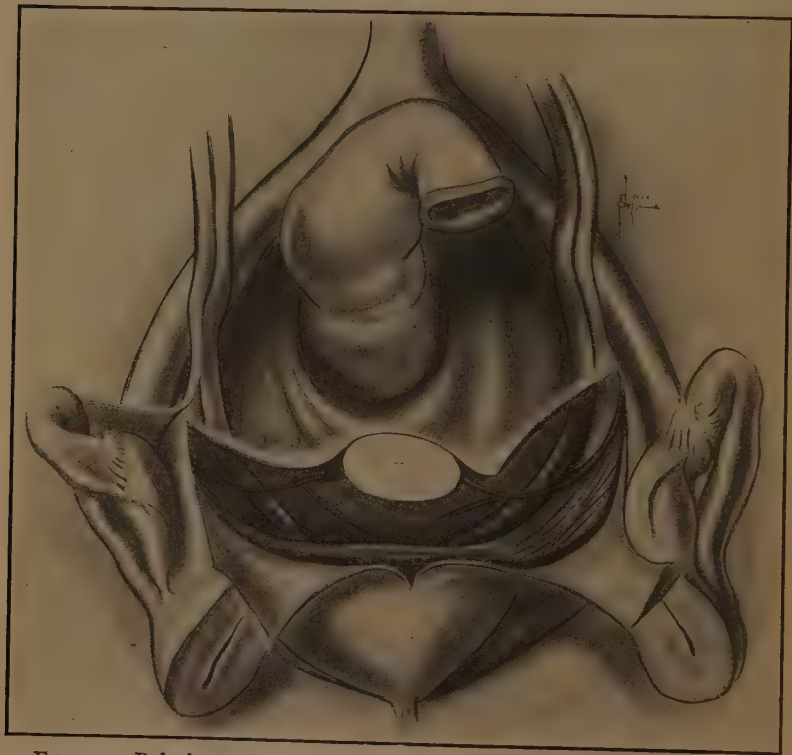


FIG. 17.—Relations of ureters, uterine artery and cervix. (*After Edgar.*)

anterior surface of the hypogastric artery. On the lateral pelvic wall the ureter forms the posterior boundary of the ovarian fossa on the obturator internus. After reaching the pelvic diaphragm it runs in the base of the broad ligament, passes toward the median line, and is crossed by the uterine

artery from 1 to 2 cm. lateral to the cervix. At this point it lies inferior to the artery among the uterine veins, and is immediately above the lateral vaginal fornix. It then enters the bladder wall at a distance of from $3\frac{1}{2}$ to 4 cm. from its fellow, courses obliquely through the bladder wall from 1 to 2 cm., and terminates at the ureteral papilla. The pelvic ureter is constricted at a point just above its vesical orifice and again where it crosses the pelvic brim, and just above each constriction is found a fusiform dilatation.

THE UTERINE LIGAMENTS

The uterine (round) ligaments begin at the lateral margins of the uterus anterior and just inferior to the tubes. Each ligament passes laterally between the layers of the broad ligament, making a slight projection under its anterior fold. It reaches the anterior abdominal wall at the abdominal inguinal ring. There it curves sharply about the inferior epigastric artery and passes along the inguinal canal to the subcutaneous ring. At this point it turns downward over the superior margin of the pubic bone to terminate in the labium majus. In its course through the inguinal canal it may be accompanied by a tube of peritoneum known as the vaginal process, a foetal structure which sometimes remains open in adult life. The round ligament is thickest at its uterine end and gradually becomes thinner to its termination. It is composed of unstriped muscle continuous with that of the uterus. The artery of the round ligament is a branch of the inferior epigastric which runs in the ligament toward its uterine end, where it anastomoses with branches from the ovarian and uterine.

BROAD LIGAMENTS

The broad ligaments have been described previously as a double layer of peritoneum extending from the uterine margins laterally to the pelvic wall. Within them are found the uterine

tubes superiorly, with their vessels, nerves, and lymphatics. Inferior to the tube are the ovarian vessels, nerves, and lymphatics. Occupying a position anterior and fairly inferior to the ovarian vessel is the round ligament. The tube, round

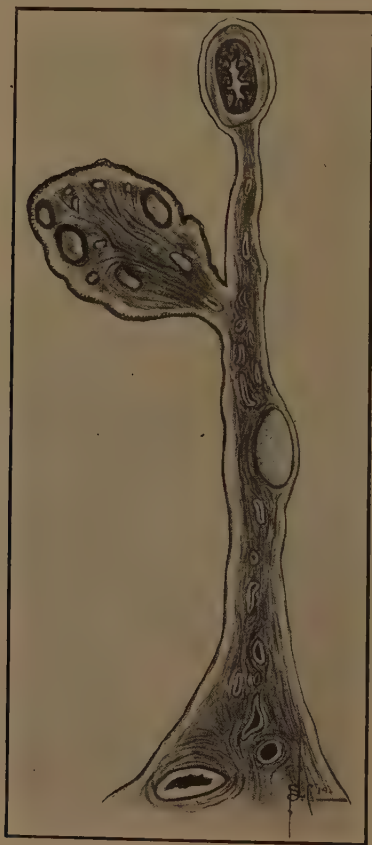


FIG. 18.—Diagrammatic section of broad ligament. (*After Morris.*)

ligament, ovarian artery and true ligament of the ovary approach each other as they near the uterus. The superior margin of the broad ligament external to the ovary contains the ovarian vessels, and is known as the suspensory ligament of the ovary or

infundibulo-pelvic ligament, in distinction to the true ovarian ligament which runs from the inferior mesial end of that organ to the uterus. In the bases of the broad ligaments are found the uterine vessels and ureters whose relations have been described, and surrounding them is the connective tissue known as the parametrium.



FIG. 19.—Broad ligament and its contents seen from the front. (After Sappey.)

PELVIC FASCIA

The fascia of the pelvis minor is a continuation of the iliac fascia. It makes bony attachments as it passes downward over the linea terminalis (ilio-pectinea line) to cover the obturator muscle. Shortly below the pelvic brim, it splits into three layers along the line of origin of the levator ani muscle. The *external layer* continues down the pelvic wall on the internal surface of the obturator internus muscle and is known as the obturator fascia. The *middle layer* covers the external and inferior surface of the levator ani and is known as the inferior fascia of the pelvic diaphragm. These two layers thus line the outer and inner walls of the ischio-rectal fossa. The *internal layer* covers the internal and superior face of the levator ani and is known as the superior fascia of the pelvic diaphragm.

It is in direct contact with the pelvic viscera, each of which in turn receives from it a sheath or layer. These various layers, which are split off from the superior fascia of the pelvic dia-



FIG. 20.—Diagram of the pelvic fascia. (After Morris.)

phragm and from the pelvic fascia proper at the tendinous arch of the levator ani muscle, form the connective-tissue linings and attachments of the pelvic viscera, and collectively are known as the *endo-pelvic fascia*.

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CHAPTER II

PHYSIOLOGY

The primary function of the genitalia of both sexes is the reproduction of species. In women there are a number of associated physiological activities which may be perverted and thus lead to their classification as gynæcological diseases, or the performance of the physiological acts necessary for reproduction may be productive of injuries which are recognized as gynæcological lesions. As an example of the first class may be mentioned extremely painful menstruation; of the second, laceration of the pelvic floor during labor.

The physiological reproductive functions of the female mammal are ovulation, reception of the seminal fluid, its transmission to the place of union between the spermatozoid and ovule, retention of the fertilized ovule until the embryo is able to exist independently, expulsion of the embryo from the uterus, and the return of the genital organs to their condition previous to impregnation. In the human female another function, menstruation, is added.

The actual physiological functions of the reproductive organs of the human female are therefore in their order; menstruation and ovulation; reproduction including impregnation, gestation, and labor; and involution.

Menstruation has been defined as "a periodical discharge of blood and mucus from the female genital organs, taking place every 28 days from puberty to the menopause, excepting during gestation and lactation." Although the above definition covers the clinical phases of menstruation it is subject to many exceptions without deviation from the normal. Menstruation need not necessarily occur every 28 days, some women men-

struating every three weeks and others at much greater intervals; while still others are habitually irregular and suffer no inconvenience therefrom. During the first three months of pregnancy, menstruation may continue to take place owing to the fact that the decidua vera and decidua capsularis do not fuse until the fourth month. The absence of menstruation during lactation is but slightly more common than its occurrence, and some women menstruate as regularly during lactation as at any other interval between pregnancies.

The duration of normal menstruation is from three to six days, although an occasional individual menstruates but one or two days at each period throughout her active sexual life, and remains perfectly well. The amount of blood lost at each period can only be estimated, and each woman is a law unto herself in this respect. One peculiar characteristic of normal menstrual blood is its failure to clot. Many widely different reasons have been given to account for this, but it seems almost certain that during its passage through the endometrium some substance has been added which inhibits clot formation, as a mixture of menstrual blood with freshly drawn blood remains uncoagulated.

Menstruation begins at about the time of puberty at which period conception is rendered possible through the maturation of the ovules and their discharge from the ovaries by the rupture of the follicles which contain them, and it generally ceases with the cessation of this function of the ovaries. The age for the onset of menstruation in the north temperate zone varies from 10 to 14 years, but instances of earlier menstruation are common, while it is not unusual to have the first period delayed until 16 or 18. Instances of true precocious menstruation are known and are not to be confused with the bloody vaginal discharge which occasionally takes place in new-born female infants. Menstruation may recur with perfect regularity after the function is once established, or there may be irregularities during the first year or two following its onset. It seems to be

established at a somewhat earlier age in city girls than in those living in rural districts, and the age of onset appears to bear a distinct relation to the degree of mental development of the individual.

That period in the life of the individual woman at which the reproductive functions permanently cease is known as the menopause. It is marked by the cessation of menstruation and the gradual establishment of atrophic changes in all the genital organs.

The age at which menstruation normally ceases varies within wide limits. An occasional instance of cessation before the 40th year is noted but regularity may persist until after 50. Final cessation most frequently occurs at 45, 46, or 47, and as a rule, cessation of menstruation takes place at an earlier age in women who began to menstruate late, and later in those who began to menstruate early. Irregularities are likely to have been noticed for some years preceding this event, and it is only occasionally that menstruation ceases abruptly and without previous warning in the way of missed periods, scanty flow, or alternation between scanty flow and profuse blood loss. Nervous phenomena during this time are quite as striking as the menstrual irregularity, and they usually persist for a year or more after menstruation has entirely ceased. Headache, "nervousness," "hot flashes," flushing of the face, palpitation of the heart, and profuse perspiration are the most noticeable. The cause of these evidences of irritability of the central nervous system is unknown, but presumptively they are due to cessation of ovarian function and, more than likely, to failure of an internal ovarian secretion.

Regarding the *ultimate* cause of menstruation nothing has been definitely established, although certain associated facts are well understood. Thus menstruation ceases after complete removal of both ovaries. The ovaries, therefore, are necessary in order that menstruation may occur, and as menstrual cessation after complete double ovariectomy is instantaneous, as

distinguished from the gradual cessation at the normal menopause, it is evident that some function of the ovaries, which is suddenly checked by their removal, dies out gradually at the age of normal cessation. In the past, ovulation has been assumed to be the fundamental cause of menstruation, and it has been taken for granted that ovulation occurs as a regular periodical process, an individual ovulation being responsible for each individual menstruation. A few recent writers even support this view, but the abdominal cavity has been opened so frequently in the last few years that many opportunities have been afforded to inspect the ovaries at varying intervals both before and after menstruation, and it seems to be definitely established that ovulation does not occur with the clock-like regularity of menstruation. In addition, ovulation could only occur one-half as often if one ovary were removed, still less often if one ovary and half of the other had been removed, etc.; the fact is that menstruation is as regular with only a portion of one ovary remaining as with both. While ovulation, therefore, probably is responsible for menstruation, each menstrual period is not produced by its own individual ovulation. The recent discoveries of active physiological function by the production of an internal secretion in such organs as the adrenals, thyroid, and pituitary body are suggestive of similar functions on the part of the ovaries and the known facts in no way contradict this idea, indeed it likely will be found that a true hormone is produced in the ovary which furnishes the required chemical stimulus to menstruation. Some of the latest researches point to the corpus luteum as the original source of a menstrual hormone, while others make it seem probable that the interstitial ovarian cells are responsible for it.

Certain changes of a histological character which take place in the uterus at the time of menstruation are also the subject of some dispute. The following facts, however, are unquestioned: (1) The uterus as well as all the other pelvic organs is engorged with blood. (2) There are extravasations of blood under

the superficial epithelium lining the uterine cavity. (3) Minute portions of this epithelium are cast off with the menstrual blood.

The chief point of discussion concerns the method by which blood extravasation takes place. Some authorities hold that the superficial epithelium is largely cast off, and that the capillaries rupture because of increased vascular tension, while

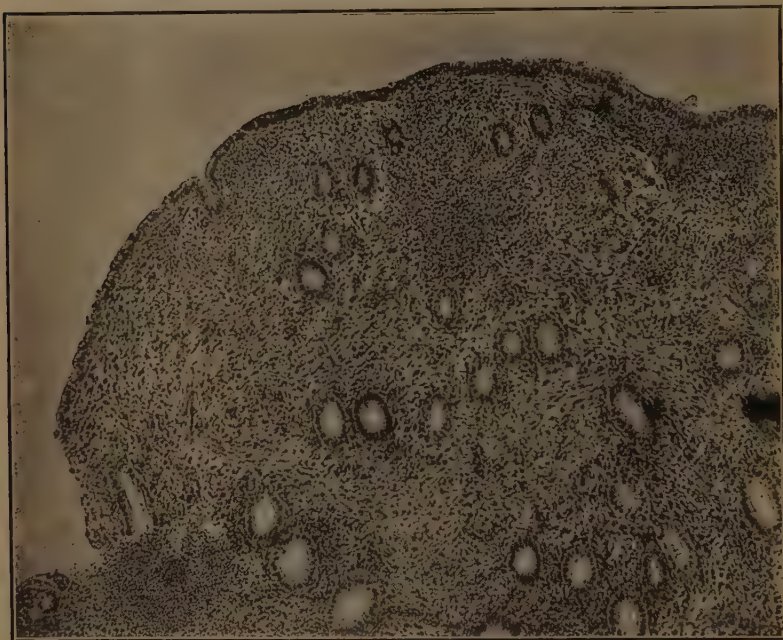


FIG. 21.—Menstrual endometrium. This section shows both the premenstrual congestion and the escape of blood. The glandular elements are here unchanged but the interglandular tissue is very loose, œdematous, and in some areas saturated with blood. The more finely stippled areas beneath the surface and at the lower left are masses of red blood cells. At the lower left the blood is escaping.

others believe that diapedesis of red cells takes place without injury to the vessel wall. Future studies of uteri removed during menstruation should definitely settle this point, the number of observations at present being too limited to permit of any permanent conclusion.

That there is a regular evolution of the endometrium, pro-

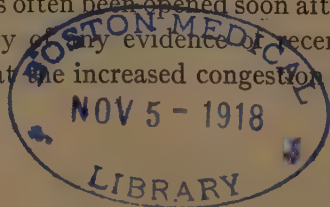
ceeding through well-defined stages from one menstrual flow to the next, has been well established by the histological examination of the endometrium of uteri removed at various times during the intermenstrual interval. So definite is this that some authorities consider the entire 28 days as nothing more nor less than a true menstrual cycle, of which the period of bloody discharge is but a manifestation of one of the stages. Whether or no the tubes regularly contribute to the discharge of menstrual blood is doubtful, but they have at times been observed to do so, both by the author and by others.

Since physiological functions are painless, menstruation should have no definite painful symptoms, but in civilized women there is, with very few exceptions, some discomfort at this time. Ordinarily there is more or less backache and a bearing-down sensation in the hypogastric regions and, in many instances, rhythmic pain or cramps which the patient locates just posterior to the pubis. It is difficult to say just how much discomfort is physiological, but generally speaking, sufficient disturbance to incapacitate the patient may be considered as exceeding the normal. Associated with this discomfort there is malaise and nervous irritability. Ordinarily the flow itself is darker than normal blood and it contains an admixture of mucus which has its origin in the glands of the cervix. This cervical mucous discharge precedes and follows menstruation for a day or two and usually is free enough to be perceptible as a moderate leucorrhea.

Ovulation consists in the ripening of an ovule and its discharge from the ovary. One ovule is present in each follicle, the follicles existing in the ovaries from the time of embryonic development and having their origin in the egg cords of embryonic life. While the actual number of follicles in each ovary is indeterminate it has been estimated at 35,000, and in the ovaries of the mature woman they can be seen in all stages of development.

The process of ripening is evidenced by enlargement of the follicle through the accumulation in its interior of an increasing

amount of the fluid known as the liquor folliculi. Pressure atrophy of the ovarian substance overlying the follicle continues until the latter finally projects about the surrounding surface of the ovary. The external wall of the follicle becomes progressively thinner until increased pressure from within results in rupture of the wall and discharge into the abdominal cavity of the follicle and liquor folliculi, together with the mass of cells known as the cumulus oophorus or discus proligerus which surrounds the ovule. The after-history of unimpregnated ovules is unknown; whether many of them die in the abdominal cavity and are absorbed, whether carried into the uterine tubes to undergo the same fate, or whether they are discharged into the uterus, is uncertain. With rupture of the follicle there occurs a hemorrhage into the cavity which remains, giving it the appearance of a small hæmatoma. Later this takes on a yellow color from the presence of lutein cells whose exact origin is unknown but from which the name, corpus luteum, is derived. Connective tissue soon makes its appearance in the corpus luteum, and should pregnancy not occur a small white scar forms upon the surface of the ovary to mark the site of rupture of the follicle, the whole process occupying a period of three or four weeks. Should pregnancy occur, the changes above outlined are more pronounced, the corpus luteum attains a larger size, and three or four months will elapse before the corpus luteum is entirely replaced by connective tissue. The microscopic appearance corresponding to the above-described gross changes are minutely described in obstetric text-books. The time elapsing between successive ovulations is not definitely known and, as has been indicated in the preceding section, its exact relation to menstruation is uncertain. In the author's experience corpora lutea in the same stage of development never have been found simultaneously in both ovaries, but the abdomen has often been opened soon after menstruation without the discovery of any evidence of recent ovulation. It seems probable that the increased congestion incidental to menstrea-



tion may provoke rupture of a follicle which is already ripe, but there is no known reason why their cyclic periodicity should coincide unless ovulation is regularly periodical and the menstrual hormone really is a product of the corpus luteum at some time during the involution of that body.

Pregnancy and Labor.—Pregnancy and its corollaries, labor and abortion, are productive of a large proportion of all gynæcological disorders.

Pregnancy begins with the fertilization of the ovule and ends with the discharge of the ovum from the uterus, regardless of whether this occurs prematurely or at full term. In the human being the point of fertilization or union of the spermatozoid with the ovule has not been definitely determined, but by most authorities it is considered to be the interior of the uterine tube, whence, it is assumed, the ovule has been floated by a stream of peritoneal serum diverted in this direction by the activity of the ciliated tubal epithelium. After fertilization the ovum is carried into the uterus by the tubal epithelium, where it becomes embedded in the endometrium, probably by its parasitic qualities, and it remains in the uterus until complete development, providing premature expulsion does not take place. The time elapsing between impregnation and expulsion of the full term foetus is approximately 280 days, after which time automatic contractions of the uterine muscles occur and result in the discharge from the uterus of the foetus, placenta, and membranes.

Various theories have been propounded to explain why the spontaneous activity of the uterus is set up at the expiration of this particular period of time, but none of them are adequate unless they take into consideration the law of the survival of the fittest. If the human foetus were expelled much before this regular time it would be lost by reason of insufficient development; if pregnancy were protracted much beyond the allotted time, death of the foetus would be inevitable because of its excessive size. The tendency, therefore, has been to preserve the offspring of those women whose gestation periods corre-

sponded most closely to the time required for the development of a foetus sufficiently developed to be viable, but not so large as to jeopardize its life during delivery, and this must be considered as the ultimate origin of the 280-day gestation period even though a placental hormone is proven to be the immediate cause of uterine contractions. The rhythmic contractions of the uterus, which result in the expulsion of its contents at the time of labor, also are perceptible throughout pregnancy and for several days after delivery. During pregnancy these contractions are painless and have no effect on the cervix. After labor, in multiparæ, they assist in keeping the uterus empty and are often painful. Strictly normal pregnancy rarely produces gynæcological disease, but its premature interruption frequently results in incomplete evacuation of the uterus followed by decomposition or infection of the retained products of conception. Neither is involution so perfect after abortion or after full term labor, the uterus remaining large and soft and its ligaments failing to regain their tonicity, this combination many times being responsible for displacement and prolapse. Even after delivery at full term the same series of events may ensue if infection takes place or the uterus is not completely evacuated. The cervix may be deeply lacerated and the pelvic floor injured by rapid delivery or through abnormal position or presentation, or by relative disproportion between the foetus and the maternal soft parts, and the greater part of the plastic surgery of the pelvic organs is made necessary by such injuries sustained during the course of a process which ought to be purely physiological.

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CHAPTER III

SYMPTOMATOLOGY AND DIAGNOSIS

Before proceeding to any measures for the treatment of gynæcologic disease or injury, a diagnosis of *all* the pathological conditions both within and without the pelvis should be attempted, and this should be as complete as possible. The inquiry should not end with the pelvic organs, but should extend to a careful consideration of the entire body since it is only by a searching examination that serious and even fatal blunders can be avoided. Four distinct sources of information are available in arriving at a diagnosis: (1) Family history. (2) Personal history. (3) Present subjective symptoms. (4) Objective physical signs.

Family History.—While the family history relatively is of less importance in gynæcology than it is in general medicine, it often throws light on some obscure conditions which present themselves. Thus a patient who has no history of a preceding infection may present herself with evidences of tubal or ovarian inflammation, chronic in type, whose etiology might be entirely overlooked but for a well-marked family history of predisposition to tuberculosis. While the question of family predisposition toward the development of malignancy is unsettled, its possibilities cannot be overlooked, and the influence of family tendencies in explaining delayed or precocious menstruation and late or early menopause is quite within the range of probability. Again, the mimicry of pelvic disease may be so accurate as to deceive the closest observer and may be explained only when a well-marked family history of neurasthenia, hysteria, or insanity is obtained.

Personal History.—The personal history preceding the supposed onset of the present illness is of great importance and should be obtained in the most accurate form possible. In obtaining this it generally is wise to allow the patient to tell her story in her own way, and later to bring out the salient points by a system of cross examination. It is rare to see a patient who is so well informed as to give an accurate account of the past events which bear upon her present illness, and matters of major importance may be overlooked at the first consultation that are readily ascertained subsequently. For this reason, a second, or even third consultation is judicious in obscure cases when the physical examination is unsatisfactory. In the cross examination the patient should be held down to categorical answers so far as possible. General statements, such as that a previous labor was very difficult, that she has had “womb trouble” or “ovarian disease” for many years, etc., may be wholly misleading. The duration of the labor and its mode of termination should be inquired into and the reason for the patient’s belief in the existence of disease of the uterus or ovaries definitely ascertained, when frequently it will be found that the presumed difficult delivery was normal and that the only justification for a belief in the existence of pelvic disease is pelvic discomfort or moderate dysmenorrhea. On the other hand, histories of repeated miscarriages, prolonged confinement in bed after labor or abortion, and sudden profuse leucorrhea shortly after marriage followed by chronic pelvic pain with occasional exacerbations, are almost pathognomonic in their significance.

The actual data which should be secured are, the social status; whether married, single, or widowed; if married, the number and character of labors and miscarriages; the age at which menstruation first appeared; the menstrual habit previous to the present illness; and past illnesses of any kind, whether local or general. All of these questions should be gone into systematically and should lead up gradually to the present illness,

concerning which the necessity for accurate information is at least as great. Concerning the illness itself there should be ascertained the time and mode of its onset and an account of the evolution of the symptoms up to the present time. Some patients possess a habit of irrelevancy which leads them to discuss anything and everything before taking up their chief ailment, while others act the part of unwilling witnesses in an evident attempt to withhold information. Such patients should be met by a firm request that they state just why they applied for consultation.

GYNÆCOLOGIC PAIN

Some present themselves because of plain objective signs such as a mass protruding from the vulva, abdominal enlargement, or visible discharge from the vagina, but the greater number of gynæcological patients apply for relief from subjective symptoms which they describe as disagreeable sensations or actual pain. It should be remembered that painful sensations are entirely subjective, and the interpretation of their importance demands the greatest circumspection and widest general medical knowledge on the part of the examiner. The exact location of pain as well as its character must be determined; whether it is burning, cutting, sharp, or dull; and a constant effort should be made to estimate the patient's susceptibility to pain, since the greatest difference exists in this respect. Some women are so constituted that the most trivial discomfort is interpreted as severe pain, while the capacity of others to bear suffering without complaint is remarkable. It also should be borne in mind that the actual severity of the pain bears no necessary relation to the gravity of the disease which produces it. Many serious gynæcologic diseases, such as ovarian cystoma, uterine fibroma, and early carcinoma, are essentially painless, while a prolapsed ovary or chronically inflamed tube may be the source of great suffering. The pain produced by gynæcologic lesions usually is fairly well localized

either in the neighborhood of the organs involved, or in the termination of the sensory nerves connected with the same segment of the spinal cord as the nerves from those organs.

Gynæcologic pain is most frequently present in that portion of the trunk below the level of the umbilicus, and it may extend down the thighs both anteriorly and posteriorly. The most common sites for such pain are the hypogastric regions anteriorly and the sacral region posteriorly, the latter in the form of the

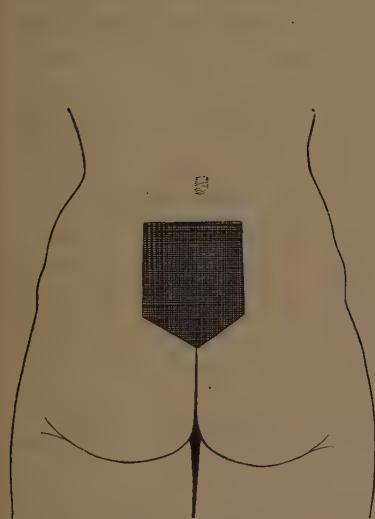


FIG. 22.—Diagrammatic representation of location of backache from disease of the pelvic organs.



FIG. 23.—Diagrammatic representation of location of anterior abdominal pain from disease of pelvic organs.

familiar sacral backache. While pain above the umbilicus may have its origin in pelvic disease, it should be viewed with suspicion as more likely to be caused by a lesion above the pelvic inlet. A marked exception to this rule is the characteristic pain about the costal margin which so frequently is present in tubal pregnancy with severe hemorrhage. Backache at the waist line which so commonly is remarked by gynæcologic patients usually is either static or neurasthenic, when it bears

no further relation to pelvic disorder than that the constantly recurring pelvic discomfort, or the strained position which the patient assumes on standing, may be responsible for the neurosis in the first instance, or the static disorder in the second.

So-called reflex pain in the head, thorax, or epigastrium should not be accepted as reflex in its origin until a careful examination of the painful area and its surroundings has revealed no evidence whatever of underlying disease. Reflex arcs ordinarily are short and are well represented by rectal tenesmus in cystitis and vesical tenesmus in hemorrhoids or fissure of the anus.

Anatomically speaking, pain arising from disease at and about the vulva is likely to be felt in the parts affected and in their immediate vicinity. Pain arising from disease of the vagina is referred to that locality. Pain from disease of the cervix is felt in the sacrum. Pain having its origin in the uterus is felt in the sacral region posteriorly and in the median line low down above the pubis anteriorly. Pain from disease of the tubes and ovaries usually is located on the side affected and directly above the pubis, although it may extend a short distance down either of the corresponding thighs and sometimes as high as the crest of the ilium. The subjective symptom of pain should not be accepted as evidence of gross disease unless supported by other and more tangible evidence.

As stated above, some patients are extremely sensitive to pain, and ordinary trivial discomfort from minor functional disturbances may be interpreted as severe pain by such individuals. More particularly, pain in a given location should not be construed as evidence of disease of the *important organs* in that region unless there are distinct objective signs of such disease. Many healthy ovaries have been resected or removed for presumed ovarian pain, when a more careful examination would have revealed an eroded cervix with lymphangitis in the base of the broad ligaments or a varicocele of the pampini-

form plexus. It is desirable always to keep in mind that *localities* giving rise to pain may be fairly well mapped out by the distribution of the pain, but not *organs*.

The type of pain suffered, while not pathognomonic, is of assistance in arriving at some conclusion as to its origin. The smarting, burning pain of urethritis, vulvitis, and vaginitis is quite characteristic, as is the lancinating pain in acute pelvic peritonitis, the rhythmic labor-like pain of spasmodic or obstructive dysmenorrhea and sub-mucous myoma, the little colicky pain of leaking tubal pregnancy, and the intense anguish of final rupture with profuse hemorrhage; while the dragging in the hypogastrium and low sacral backache are precisely what one might expect from a heavy, retroverted, and prolapsed uterus.

Leucorrhea.—Leucorrhea may be considered both as a subjective symptom, and as an objective sign since the patient describes it as she feels it, while the examiner detects it by both touch and sight. Normally there is a limited amount of discharge from the female genitalia consisting of a very thin mucoid material from the body and fundus of the uterus mixed with the thick, tenacious, colorless mucus from the cervix, a small quantity of secretion from the vaginal fornices, and the secretion from the greater vestibular glands at the vulva.

The secretion from the uterus and vagina is practically odorless, but decomposition of retained blood, necrotic tumors, and carcinomatous tissue gives rise to a foul odor which, in the case of advanced cancer, is extremely offensive.

The quantity of discharge under normal circumstances is so small as to be scarcely perceptible as a distinct discharge, and it serves to keep the vagina and vaginal outlet moist. The reaction of the uterine secretion is alkaline while that from the vagina is slightly acid. The quantity of the discharge may be changed, sometimes by trivial circumstances, and at others by well-marked disease. Increase in quantity may be produced by any circumstance which stimulates the glands to

increased activity, or by a disease process which produces exudate from surfaces that under normal circumstances are non-secreting.

Congestion of the endometrium, whether this be due to a mechanical change like retroversion, physiologic activity as in sexual excitement, or pathologic disturbance in other organs as inflammation of the tubes, is productive of increased activity of the uterine glands and a corresponding increase in the quantity of uterine discharge. Very marked increase in the cervical secretion is sometimes present without any pathological condition being found to account for it, and some general disorders, such as anæmia, sometimes are accompanied by leucorrhea. A patient's complaint of leucorrhea ought always to lead to an attempt to ascertain not only its character and amount, but its source.

A purulent discharge having its origin at the vulva should lead to a suspicion of gonorrhea, although it may be due to a non-specific vulvitis which is found much more frequently in children than in adults.

Purulent discharge originating in the vagina may likewise be due to gonorrhea, or it may be senile and trophic in character.

A distinctly purulent discharge from the cervix may be due to gonorrhea, to an unhealed laceration, to cervical erosion, or to septic infection of the cervical or uterine glands.

Long-standing purulent discharge issuing from the cervix almost invariably originates *in the cervix*, and but rarely from the body of the uterus, as has been so long taught. In case there is any doubt on this point a dry tampon may be placed over the external uterine orifice and allowed to remain for 24 hours. The character of the discharge accumulating on that portion of the tampon immediately under the orifice will determine its origin, as cervical discharge is mixed with the viscid mucus while that from the endometrium is thin and much less mucoid in character.

Microscopic examination of leucorrheal discharge reveals

gonococci if the patient has acute gonorrhea, but chronic gonorrhea may be present and no gonococci be found even after repeated examinations. Latent gonorrhea may persist for many years in the urethra, in the para-urethral ducts, in the greater vestibular glands, and in the cervical glands, and by its irritation keep up a continuous leucorrheal discharge from any of these sources.

The *character* of the discharge may be modified by an increased secretion from one section of the genital tract, other portions being normal but by reason of this increase not contributing their relative proportions. Most frequently it is changed by the addition to it of pus from infection about the vulva, vagina, or cervix. It may be blood stained from abraded surfaces, erosion of the cervix, unhealed laceration of the cervix, carcinoma of the cervix, polypi in the cervix or uterus, intense inflammatory action anywhere from the fundus uteri to the vulva, or senile changes in the endometrium and vagina which deprive the deep layers of their superficial covering of epithelium.

In conclusion it should be borne in mind that leucorrhea is always a symptom whose cause is to be sought and never a disease to be treated as such, and too much emphasis cannot be placed on the fact that leucorrhea and endometritis are not synonymous terms.

MENSTRUAL DISORDERS

In the consideration of menstrual disorders as symptoms, two distinct points should be kept in mind. The first is the absence of any type by which to standardize normal menstruation, as is emphasized in the paragraphs devoted to that subject; the second is that while it may be necessary to consider menstrual disorders as entities for purposes of treatment they are nevertheless wholly symptomatic.

Menstrual disorders are classified as amenorrhea, or absence of menstruation; menorrhagia or profuse regular menstruation;

metrorrhagia or irregularly frequent menstruation; dysmenorrhea or painful menstruation.

Amenorrhea.—Very scanty menstruation as well as its total absence may properly be included under this heading, since under some circumstances scanty menstruation is merely a milder form or earlier stage of the same disturbance which under other circumstances may cause complete suppression.

It is self understood that amenorrhea is normal before the onset and after the close of menstrual life. During menstrual life the flow is physiologically absent throughout pregnancy and often also during lactation.

In order to arrive at the diagnostic significance of amenorrhea in a given case it is well to remember that there are two distinct types: in one, menstruation has never occurred although the patient is well past the age at which it usually appears; in the other, it is suspended either suddenly or gradually after a period of normal menstruation.

In the first form, which may be called primary amenorrhea, some deformity or mal-development of the genital organs should be suspected, either congenital absence of the ovaries or uterus, or congenital atresia of the genital tract at or below the internal uterine orifice. In congenital absence of the ovaries, the menstrual impulse is lacking; in congenital absence of the uterus, the organ from which the flow proceeds is missing. In atresia, both impulse and flow are present but the discharge is retained and fails to make its appearance at the vulva.

In considering primary amenorrhea, attention again must be called to the great variations in the age at which the menstrual function is established. It is not unusual to see perfectly robust girls of 16 or 18 in whom menstruation has not made its appearance and in whom examination reveals no abnormality. Some instances are also known in which menstruation occurs at very irregular periods with prolonged intervals of amenorrhea during which the patient is in perfect health. In one case under the author's observation, menstruation had taken place

but once in seven years, and in this time the patient had been delivered of one child and had had two miscarriages.

Secondary amenorrhea, when occurring suddenly and without symptoms in a woman previously regular, should always be looked upon as due to pregnancy until the contrary is proven. Psychic influences, especially the fear of pregnancy, and changes of occupation and climate may cause sudden amenorrhea. Many pupil nurses have suppression of menstruation extending over several months when they first take up their training, and the same is true of recently arrived immigrant girls.

Sudden suppression of menstruation, when accompanied by symptoms of pelvic inflammation, is most frequently due to acute endometritis. The popular opinion concerning the effect upon menstruation of exposure to the weather and wetting the feet has some foundation in fact, and when suppression of menstruation occurs under these circumstances it is due to an acute endometritis.

Gradual cessation of menstruation is brought about by several widely different causes, but two stand out with especial prominence: (1) Anæmia, primary or secondary; (2) that curious type which is closely allied to the rapid development of obesity in young women and which probably bears some relation to hypo-pituitarism. Gradual cessation is also observed in severe types of chronic metritis, and either partial or total cessation may follow too vigorous curettage.

Chlorosis, which is so common in young women factory workers, develops gradually, but complete suppression of menstruation often follows, and because of the age at which chlorosis occurs it is the form of primary anæmia most frequently responsible for amenorrhea.

Anæmia secondary to any of the chronic diseases may lead to a gradual cessation of menstruation, under which circumstances the amenorrhea is to be regarded as a conservative effort on the part of nature to preserve the patient's strength by checking

blood loss. Amenorrhea in tuberculous patients is so common as to be noted by the laity, and treatment for the menstrual disorder frequently is demanded upon the erroneous ground that the suppression is the cause of the general ill health. Any of the chronic wasting diseases, such as nephritis and diabetes, malignant growths, even benign tumors such as ovarian cysts of large size, may by their continued progress cause amenorrhea, and this result would be more noticeable if they occurred during active menstrual life as frequently as does tuberculosis.

Dysmenorrhea.—A moderate feeling of discomfort at the menstrual period is so nearly universal that it may be considered normal, and no hard and fast line can be drawn between normal and abnormally painful menstruation. In an individual case, however, a sufficient amount of pain to incapacitate a patient may, from a clinical standpoint, be considered abnormal.

Many classifications of dysmenorrhea have been proposed, but four types stand out clearly whose names indicate their character: viz., obstructive, congestive, membranous, and spasmodic.

Painful menstruation due to obstruction of the outflow of blood is relatively rare and is quite generally due to congenital or acquired stenosis of the cervix.

Ordinary ante flexion does not produce a sufficient degree of stenosis to interfere with the outflow of menstrual blood, since it is normally discharged in a very slow thin stream, but if the endometrium is so diseased or menstruation is so profuse as to lead to clotting within the uterus, a normal cervical outlet may be too small to permit painless passage of the clots, and a relative obstruction is then present.

Congestive dysmenorrhea almost uniformly is present in acute endometritis and acute salpingitis, usually is present in chronic salpingitis, and sometimes is one of the symptoms of retrodisplacement of the uterus.

Membranous dysmenorrhea is a symptom of the curious disease known as exfoliative endometritis, which causes shedding

of the endometrium in shreds or even as a complete cast of the uterine cavity. It really belongs, therefore, to the type in which the cervical canal is normal in size but too small to permit the passage of the shreds without painful expulsive effort on the part of the uterus.

The origin of spasmodic dysmenorrhea may be said to be wholly problematical. Many attempts have been made to prove its dependence upon some organic change in the pelvic organs, more particularly in the uterus at and about the internal orifice, but none of the arguments presented can be said to have passed beyond the stage of theoretical conception. It is present in some young girls and nulliparous women whose pelvic organs upon examination prove to be normal in every respect, and it is closely associated with the general health of the patient and especially with the tone of her nervous system. School girls and teachers who suffer extremely from menstrual "cramps" during the school year may menstruate with little or no pain during the vacation period. Examination made during the height of the pain may show the blood escaping from the cervix in a steady stream, and the passage of a probe may be entirely unobstructed although intensely painful. These and many other facts, together with the result of various forms of treatment, compel us to classify spasmodic dysmenorrhea as a neurosis, even though further research reveals some pathological change in the uterine nerves.

Two distinct types of pain are observed in dysmenorrhea, the aching and dragging of the congestive form, and the rhythmic cramps of all the others. The aching and bearing down are readily explained by the increased pelvic congestion which precedes and accompanies menstruation, and are merely an addition to the discomfort of the primary disease. The cramp-like pain of obstructive, membranous, and spasmodic dysmenorrhea is due to painful contractions of the uterus, and in its rhythmic character it simulates the "pains" of labor. Usually it is felt most intensely in the hypogastrium, but it may extend into

the groins or down the legs, and in a few instances is located wholly in the back.

In obstructive and membranous dysmenorrhea the pain subsides as soon as the obstruction is overcome or the membrane expelled. In the spasmodic form it may begin several hours before menstruation is due and persist for a day or two after the flow is well established.

Two or more forms may co-exist, and it is not wise to base a diagnosis upon the symptoms alone except in young girls and unmarried women in whom a diagnosis by exclusion sometimes can be arrived at without examination. If no membrane is present, this variety is ruled out, and actual congenital organic obstruction is a curiosity unless so complete as to produce absolute amenorrhea. Chronic inflammatory pelvic disease in virgins is practically unknown unless it follows acute appendicitis with pelvic exudate or is tuberculous in origin and associated with other evidences of tuberculous peritonitis, so that the spasmodic type may be presumed to exist unless evidence to the contrary is quite plain, or the pain is so uniformly present under all circumstances as to lead to the presumption that it has a definite organic cause.

Attention should be called to the uniform increase in menstrual pain which is the common result of too close association with the opposite sex, and the hidden factor of an over-ardent lover accounts for many exacerbations of a previously moderate dysmenorrhea.

Menorrhagia and Metrorrhagia.—Profuse regular menstruation, technically known as menorrhagia, may originate from a general blood disorder such as hæmophilia, or, curiously enough, sometimes from anæmia. Usually it is distinctly a pelvic affair, when it still may be due to some general cause such as passive congestion of the uterus from decompensation of a cardiac lesion. More frequently, however, it is due to a purely local lesion such as retroversion, sub-involution, uterine congestion secondary to acute inflammatory processes in the tubes and

ovaries, or acute endometritis. That form of chronic endometritis which is known clinically as polypoid, fungoid, or hemorrhagic, has as its sole symptom profuse menstruation. Myomata of the uterus, unless distinctly sub-peritoneal and pedunculated, usually cause menorrhagia through their influence on the endometrium as well as from the increased size of the uterus.

Patients at or about the menopause may flow excessively without any demonstrable local disease, but it should not be taken for granted that disease is absent until a thorough examination has proven it so.

Young girls at the beginning of menstrual life sometimes flow profusely until their regular menstrual habit has been established. Later in life, the quantity of blood lost and the duration of the periods are not so important in establishing a diagnosis of menorrhagia as is a marked departure from this previously established habit.

Myomata also frequently cause intermenstrual hemorrhage, technically known as metrorrhagia, and they, together with cervical polypi and malignant disease of the cervix and body of the uterus, are its more frequent causes. Conversely, this symptom may be the only one of early malignant disease.

Finally, the association of metrorrhagia with ectopic pregnancy, and the bleeding due to threatened abortion in early normal pregnancy, must both be taken into account in attempting to determine the cause of irregular bleeding from the uterus.

EXAMINATION AND OBJECTIVE SIGNS

Objective signs are those indications of disease which are made evident to the examiner's senses through a physical examination of the patient. The methods of examination comprise not only those made use of in physical examination elsewhere, such as inspection, palpation, percussion, and auscultation; but also digital touch through the vagina and rectum

and bi-manual examination through the same avenues. By means of the latter, organs otherwise out of reach may be brought into contact with the examiner's fingers. In obscure lesions not only may all of these methods be necessary but in addition microscopic examination of urethral, vaginal, and cervical discharge, of section or scrapings of suspicious tissue, and examination of the blood. Chemical and microscopic examination of the urine always is necessary.

Both knowledge and tact are essential in determining when a gynæcologic examination is required and when it may be omitted, and in securing the necessary examination without embarrassment either to patient or examiner. In a general way it is as faulty to treat a gynæcologic patient without a pelvic examination as it is to treat a chronic cough without examination of the chest, but there are occasions when the experienced physician knows that an examination is not only unnecessary but out of place. These are usually when the patients are young girls or young unmarried women who have menstrual anomalies which are temporary in character, or else have such distinctive symptoms that a diagnosis is possible on the basis of the history alone. When an examination is considered advisable, the patient should not be asked if she will admit to it but should be told that examination is required, and asked only to state whether she is prepared for it at present or wishes to defer it until some other time.

It has been stated previously that hysteria may mimic pelvic disease, but it also should be understood that many other general conditions produce symptoms which the patient refers to her pelvis, and particularly that patient may have not only pelvic disease but other organic diseases as well. Thus it frequently happens that the physician is in serious doubt as to what lesion is responsible for the discomfort even after a most comprehensive diagnosis. In simple uncomplicated cases, such as complete laceration of the perineum, pelvic examination may suffice, but more often the entire abdomen must be interrogated,

the urine examined, the condition of the heart and lungs ascertained, and the evidences of functional nervous disorder be sought for. It is a safe plan to go over all the abdominal organs, the heart, and the kidneys, in every case in which a gynecologic examination is required.

The patient should remove her corset and loosen all articles of clothing, especially the waist bands, and an adjoining room or screened corner of the consulting room should be provided for this purpose.

The lower bowel and bladder must be evacuated and if there is any doubt concerning the condition of the latter it should be emptied by catheter under aseptic precautions. The latter procedure is advisable as a routine practice, not only to be assured that the bladder is empty, but also to secure a specimen of urine contaminated by vaginal or vulvar discharge.

Anæsthesia.—Pelvic and abdominal examinations usually can be completed without the use of an anæsthetic, but occasionally a patient is seen whose sensitiveness to pain is so great that muscular rigidity interferes with satisfactory palpation and thus the administration of an anæsthetic is made necessary, as it also is if the patient has a very thick abdominal wall which demands a degree of relaxation it is impossible to secure by voluntary effort.

When the administration of ether is demanded, it should be preceded by proper preparation and should be given by a skilled anæsthetist only.

Anæsthesia, however, is rarely required in patients who have chronic disease, since a second or even third examination usually will lead to a satisfactory diagnosis, and the repetition of examinations is preferable to the inconvenience, discomfort and danger of anæsthesia.

Position.—For abdominal examination the patient should lie in the dorsal position with the head slightly raised, while examination of the genitalia may be made with the patient either in the lithotomy or Sims's position, usually the former.

An examining table is a great convenience as it permits of the freer use of the hands than a couch or bed and the position of the examiner is less strained. The patient should be brought



FIG. 24.—Sims' or latero-prone position.

well down to the edge of the table and the feet supported by stirrups provided for that purpose. In examining a patient at her home an ordinary kitchen table may be utilized if she is not too ill to be moved. If she must be examined in bed with

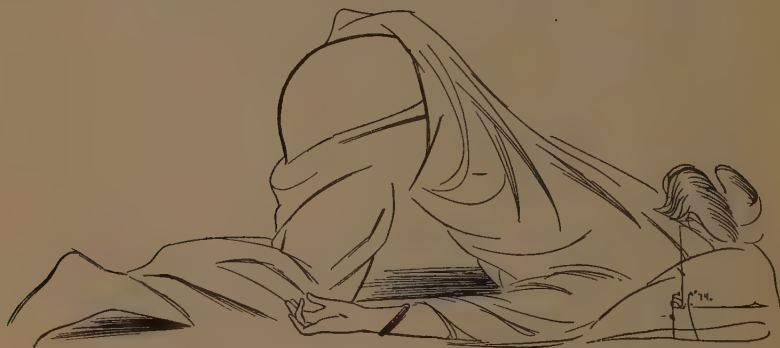


FIG. 25.—The knee-chest posture.

as little disturbance as possible it will be found that reaching the pelvic organs is facilitated if the hips are elevated upon a small pillow.

The lateral position for the detection of movable kidney, the knee-chest position in proctoscopy, and the erect position for determination of the degree of prolapse of the kidney or uterus are sometimes required and will be mentioned again when those subjects are under consideration.

Extreme exposure of the patient never is necessary, and those portions of the body not under direct observation should be properly covered, but no consideration of modesty should lead to imperfect exposure of such parts as it is necessary to see in order to secure full information.

Instruments.—The simpler and fewer the instruments used the better. All office instruments should be sterilized as more than one instance is on record of infection through the medium of imperfectly sterilized specula and sounds. The more the hands displace instruments the better becomes the tactile sense of the physician, and the less often does he find himself unable to complete an examination away from the office or hospital because some instrument is mislaid or forgotten. A stethoscope, a bivalve vaginal speculum of the simplest type, a bivalve or trivalve rectal speculum, a long dressing forceps, and dull tenaculum forceps are most frequently required, while the Sims's speculum or other form of single-bladed perineal retractor and the uterine sound are needed occasionally. The sound is fairly pregnant with danger and never should be used unless absolutely necessary.

Inspection.—While it is customary to combine inspection of the abdomen with palpation, percussion, etc., before the genitalia are examined, it gives a better idea of the scope of the various methods of examination if they are discussed separately.

Upon inspection of the abdomen one should note all visible deviations from the normal. Changes in the color of the skin can be observed and may be only part of a general discoloration as from obstructive jaundice, or the discoloration may be confined to the abdomen or a localized portion of the abdomen. Prolonged hot applications and blisters frequently

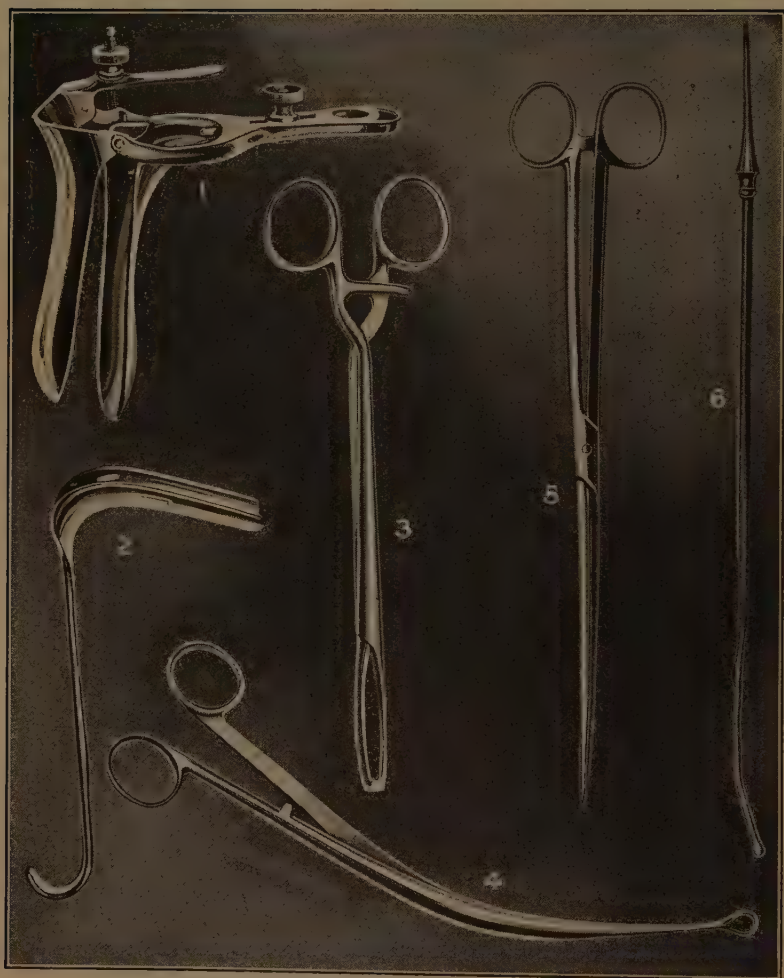


FIG. 26.—Instruments for vaginal examination. 1, Bivalve speculum; 2, single-bladed perineal retractor; 3, straight volsellum forceps; 4, curved tenaculum forceps; 5, uterine dressing forceps; 6, uterine sound.

leave an area of bronzing. Pregnancy gives the dark stripe up the median line; and over-stretching of the skin, whether due to pregnancy, tumor, or the rapid development of fat, causes the delicate pink and white striæ which later take on a scar-like appearance. The white shiny look of the œdematous skin over an ascitic abdominal cavity also may be observed.

The abdominal contour should be noted. The flat, flabby abdominal wall leads one to suspect visceral ptosis and displacement of the pelvic organs. The regularly enlarged abdomen at once reminds one of pregnancy, ovarian cyst, and ascites; while irregular or nodular enlargement leads one to think of fibroma of the uterus, tuberculous peritonitis, or a malignant growth. Visible peristaltic waves make it necessary to determine whether a point of obstruction is not present somewhere in the alimentary canal.

Inspection of the vulva reveals parasites or their larvæ, the thickened corrugated skin of pruritis vulvæ, the white shiny pearl-like skin of kraurosis, and the bright red of vulvitis. The blue or purple discoloration of pregnancy may be present, and at a very early date this can be seen just below the external urethral orifice. A yellow purulent discharge may be observed exuding from the urethra in acute gonorrhea, and a tiny red spot at the orifice of the duct of the greater vestibular gland may confirm the suspicion of an old gonorrhea. Urethral caruncle, condylomata, chancre, varices in the labia, the outlines of a distended Bartholinian gland, and epitheliomata, may all be seen and sometimes diagnosed by inspection alone.

The condition of the hymen, whether imperforate, unruptured, or ruptured, may be taken in at a glance, and the extent of an injury from a previous labor may be estimated by the distance of the anus from the external urethral orifice, the gaping of the vulva, and the presence of scars about the vaginal entrance.

Inspection of the vagina and cervix is best made by the aid of the bivalve speculum which separates the anterior and pos-

terior walls of the vagina and so exposes to view its lateral walls, the vaginal fornices, and the cervix. The Sims's or any single-bladed speculum, depends for its efficiency upon the fact that if the patient lies in the latero-prone position while the perineum is retracted, air rushes into the vagina and distends it so that a more complete smoothing out of its rugæ is accomplished. Practically this is rarely necessary and as an



FIG. 27.—Relaxed vaginal outlet. Owing to injury to pelvic diaphragm the vulva gapes and the anus has dropped posteriorly.



FIG. 28.—Intact vulva after labor. Hymen absent. Hymeneal caruncles smoothed out, but anus and urethral orifice not widely separated.

assistant is required for its use it cannot be utilized in office practice so readily as the bivalve. Certain forms of fenestrated blades, and specula with three or even four blades occasionally are useful in treatment, but are by no means essential for examination.

The bivalve speculum should be warmed, oiled with sterilized vaseline or other sterile lubricant, and introduced with its blades closed. Slight backward pressure upon the perineum

should be made as the tip is introduced in order to avoid pressure upon the sensitive urethral orifice, and the end of the instrument should follow the direction of the posterior vaginal wall. Upon opening the speculum the cervix drops between the ends of the blades, or it may be made to do so by a little manipulation. The walls of the vagina may thus be seen and any abnormalities of color, discharge, etc., be detected. The appearance of the cervix should be carefully observed. Nabothian follicles, advanced carcinoma, polypi, erosions, prolapse of the cervical mucosa, hypertrophy of the entire cervix, and stenosis of the external os are visible. Laceration of the cervix may be apparent at a glance, but partial closing and opening of the speculum is sometimes necessary in order to differentiate the torn cervix with healed edges from a simple hypertrophy.

Percussion.—Percussion is of value in gynæcologic diagnosis in a limited number of instances, but sometimes its findings are of positive value.

Normally the percussion note over the entire anterior abdominal wall, from the costal margin down, gives a tympanitic note from gas in the alimentary tract. Collections of fecal matter in the large intestine may give a dull note, but if the bowel has been emptied as directed tympany is everywhere present, although the pitch of the note varies over the different hollow viscera. Distension of the stomach by air introduced through a stomach tube, or by carbon dioxide through the use of a Seidlitz powder the two portions of which have been dissolved and drunk separately, enables one to outline the stomach by this difference in the percussion note. Likewise the location of the colon and its relation to any abnormal mass in the abdomen can be made out by colonic inflation and observation of the relation of the distended tympanitic colon to the mass. This inflation is readily accomplished with an atomizer bulb attached to the ordinary rectal nozzle. A distended gall-bladder lies in front of the inflated colon and an enlarged or

movable right kidney is behind it; an enlarged or prolapsed spleen is in front of the colon and a displaced left kidney behind it. Areas of dullness or flatness in the upper abdomen may be produced by an enlarged liver or spleen, by new growths, by

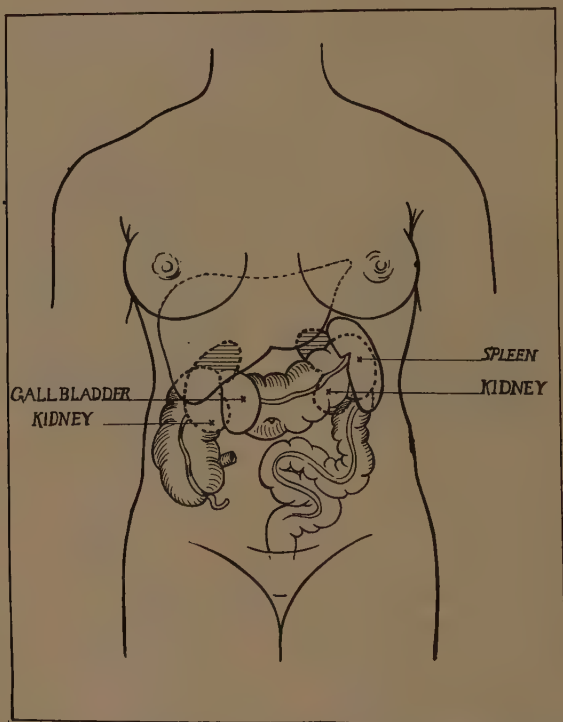


FIG. 29.—Diagram illustrating "A displaced right kidney lies behind distended colon, the gall-bladder in front of it. An enlarged or displaced left kidney lies behind the colon, the spleen in front of it."

retained stomach contents, or by exudate about infected viscera. Perforated viscera, and appendicitis either with or without perforation, may result in large abscess cavities, the exudate about which gives dullness, while over the cavity itself a tympanitic note is heard which is due to gas formation from the

activities of the colon bacillus. Tuberculous peritonitis with exudate may give rise to flatness over localized collections of fluid anywhere in the abdominal cavity. A dull or flat note over the pelvic cavity sometimes is found in recently ruptured ectopic pregnancy with profuse hemorrhage, and always is found directly over a pregnant uterus or a tumor of the uterus or ovary. Change in the location of a flat area, due to free fluid in the abdominal cavity, when the patient is turned from side to side is characteristic of ascites and assists in distinguishing it from pregnancy, a new growth, and walled-off effusion such as is found in tuberculous peritonitis.

Auscultation.—Auscultation over the normal abdomen reveals the gurgling of gas and fluid in the stomach and intestine which probably is due to peristalsis. Its entire absence is indicative of intestinal paresis and may mean general peritonitis. Immediately after an abdominal operation there may be absence of these peristaltic sounds because of traumatic paresis but this passes away after a few hours. Under either of these conditions the respiratory and cardiac sounds are likely to be plainly perceptible.

Violent peristaltic sounds are heard during the early stages of organic intestinal obstruction and correspond in time to rhythmic attacks of pain. A distinct bruit, synchronous with the patient's pulse, may be distinguished over the large vessels of the abdomen if sufficient pressure is made with the stethoscope, but not otherwise.

Auscultation over a tumor which has its origin in the pelvis and rises into the abdominal cavity may serve to distinguish the pregnant uterus from a new growth. The so-called uterine bruit of pregnancy is heard over no other abdominal enlargement save an occasional myoma. This bruit is synchronous with the patient's pulse and is most distinct just external to the uterine fundus on either side. Repeated observation has convinced the author that the origin of this bruit is not in the uterus but in the utero-ovarian artery just

below the uterine tube. Foetal heart sounds may be heard over a similar enlargement if pregnancy beyond seven months is present and the foetus is living.

Auscultation is thus chiefly of value in differentiating advanced pregnancy from other sources of enlargement of the abdomen, and it assists in the diagnosis of general peritonitis and intestinal obstruction.

Palpation.—It is through the tactile sense of the examiner's fingers that the principal objective signs of disease of the abdominal and pelvic viscera are discovered, and this method is known as palpation.

Abdominal palpation is performed with one or both hands, and by it an effort is made to ascertain the presence or absence of rigidity of the abdominal walls, elicit either superficial or deep tenderness, outline the organs in their normal position, and discern the size, shape, consistency, etc., of displaced or diseased viscera. Palpation through the medium of one or more fingers in the vagina or rectum is known respectively as digital vaginal or digital rectal examination. Palpation with the finger or fingers of one hand in the vagina or rectum, while the other hand makes counter pressure upon the abdomen in such manner as to bring the pelvic viscera between the hands thus occupied, is known as bi-manual vaginal or bi-manual rectal examination.

The normal size, shape, mobility, and consistency of all the palpable organs must be familiar before deviation from the normal can be appreciated, and for this reason, if for no other, the occasion should be grasped to make a *complete* examination at every possible opportunity.

Abdominal palpation should be made with the hands warm and placed flat, and at the beginning of the examination it should be very gentle. If a given abdominal area is known to be tender, it should be avoided during the early part of the examination, and an effort should be made to ascertain the general sensitiveness of the skin covering the abdominal wall

and the voluntary resistance of the muscles to pressure, leaving known diseased areas until this information is obtained. As the patient gains confidence and learns that she will not be



FIG. 30.—Abdominal palpation. Proper method, hand flat on abdominal wall.



FIG. 31.—Abdominal palpation. Improper method, fingers applied end on.

made to suffer unnecessary pain, more pressure can be made, and it often happens that a stout rigid belly wall will become soft and relaxed as it becomes accustomed to the necessary manipulations. The advantage of distracting the patient's

attention and securing easy tranquil respiration should not be overlooked.

By palpation of the organs of the upper abdomen but little can be made out when they are normal. On deep inspiration the edge of the liver may be felt and the lower pole of the right kidney palpated between the hands. The left kidney rarely can be found unless abnormally mobile. If the abdominal wall is very thin and relaxed, the pylorus can sometimes be felt undergoing alternate contraction and relaxation, and the empty cœcum can be rolled under the fingers.

That the normal appendix ever is palpated is doubtful, although some skillful examiners claim to be able to perform this feat.

Localized superficial tenderness may be due to underlying disease as pointed out by Head, and a careful perusal of his article is well worth the time required as it emphasizes the relation between disease of the various viscera and the corresponding sensitive skin areas. Deep tenderness usually means disease of the underlying organ upon which pressure is made.

By palpation of the abdomen above the umbilicus one notes displacement or enlargement of the kidney, spleen, or liver, distension of the gall-bladder, new growths in the abdominal wall, in the organs in the peritoneal cavity, or in the retro-peritoneal lymph glands, and the exudate due to inflammation about infected areas which involve the peritoneum.

Palpation of the abdomen below the umbilicus may reveal the same abnormalities, and in addition enlarged organs, tumors, or exudate which rise into the abdomen.

Assistance in determining the normal location of a displaced organ or the attachment of a new growth can be obtained by discovering and palpating its pedicle and replacing the organ in that direction from which the pedicle proceeds. Adhesions to surrounding structures may prevent such displacement, when the size, shape, and consistency of any normal organ which might occupy this locality should be given consideration, to-

gether with all the possible disease processes which could produce conditions such as are found in the individual case.

Digital Vaginal Examination.—As remarked before, this is a method of palpation with the finger or fingers in the vagina.



FIG. 32.—Method of performing bimanual vaginal examination.

While it is habitual with some to use two fingers of the same hand, it will in the long run be found most satisfactory to use

the forefinger of each hand, the right for the right side of the pelvis and the left for the left.

The labia should be separated and the finger introduced and turned with its palmar surface laterally to test the resistance of the pelvic outlet. Normally, the fibers of the levator ani muscle on either side can be felt like one-half of a sling supporting the vagina and rectum and offering marked resistance to their backward displacement. Any laceration into the rectum will have been discovered by previous inspection, and under these circumstances the levator will be felt intact, as its fibers pass lateral to the vagina to be attached behind the posterior rectal wall. Injuries which interfere with the function of the pelvic floor as a diaphragm will be indicated by the absence of this sling of levator on one or both sides. The distance of the cervix from the vaginal orifice, and the direction in which it points, should be ascertained. Injuries to the cervix are palpable, and nodules due to Nabothian follicles, cervical fibroids, or carcinoma, can be felt.

The finger in the vagina, unaided by pressure from above, rarely is able to appreciate changes in the organs superior to the vaginal fornices except in the case of large tumors or pelvic exudate which of themselves provide sufficient counterpressure.

Bi-manual Vaginal Examination.—It is upon this method of palpation that recognition of the greater number of diseases of the supra-vaginal portion of the pelvic organs depends. The finger is introduced into the vagina as in digital examination and the other hand placed flat upon the anterior abdominal wall, its purpose being to fix the pelvic structures and enable the vaginal finger to appreciate their size, shape, consistency, and attachments. The pressure required of the hand on the abdomen varies with the degree of resistance offered by the abdominal wall, and it always operates to greater advantage if the patient can be persuaded to relax her abdominal muscles completely. By some individuals this can be done voluntarily, while others resist in spite of all efforts to the contrary unless

their attention can be diverted from the examination which they are undergoing. By using gentle steady pressure and being careful to give no more pain than is absolutely necessary, a satisfactory exploration of all the pelvic structures usually can be accomplished, but an extremely nervous patient, or disease which produces exquisite sensitiveness, will defeat the most careful examiner. If under these circumstances the necessity exists for an immediate diagnosis, an anæsthetic is indicated.

Ordinarily the uterus can be outlined, and its size, shape, consistency, and location determined. The normal ovaries are palpable, and through a thin, flaccid abdominal wall it is possible to palpate the utero-ovarian ligaments, uterine tubes, and the round ligaments at their uterine extremities. A highly educated touch may trace the normal ureters from the base of the bladder to their entrance into the broad ligaments, and distinctly enlarged inflamed ureters are plainly perceptible. Deviations from the normal in size, form, consistency, and location, of the uterus, tubes, and ovaries are determined by bi-manual examination, and peritoneal exudate in the pelvic cavity, or the deposit of inflammatory material in the cellular tissue around the cervix and in the broad ligaments, can be felt.

Digital and Bi-manual Rectal Examination.—By digital examination per rectum one can feel the normal cervix and sacro-uterine ligaments. Bi-manually it is possible to palpate the entire uterus, and it is advisable to use this method in examining virgins because it gives less pain than vaginal examination and involves no risk of injury to the hymen.

Carcinomata, and stricture of the rectum following other ulcerative processes can be palpated with one finger, and the grosser abnormalities of the female genitalia are easily discovered through bi-manual rectal examination. The rectum can be inflated by placing the patient in the knee-chest posture and opening the anus with a small speculum, when, upon returning the patient into the dorsal position and practising bi-

manual rectal palpation the pelvic structures will feel as though skeletonized as pointed out by Howard Kelly. Nearly or quite as accurate an idea of the condition of the pelvic organs can be ascertained by this method as by vaginal examination.

Microscopic Examination.—Microscopic examination of the discharge from the female genitalia is principally of use in the diagnosis of gonorrhea. While the absence of gonococci from a given specimen proves nothing, their presence is positive evidence of gonorrhea. Gonococci most frequently are found in the discharge from the urethra, para-urethral ducts, Bartholinian ducts, and the cervix.

Other micro-organisms such as streptococci, staphylococci, and the bacillus coli are often found, but none are of diagnostic importance unless there are clinical evidences of infection, as they may be present about the genitalia by accident. The vaginal bacillus is normal to the vagina and the smegma bacillus to the surfaces about the urethra and clitoris. The latter organism sometimes contaminates specimens of urine and is mistaken for the bacillus of tuberculosis which it closely resembles.

Sections of tissue removed from the genital organs have the same pathological and diagnostic significance as from other parts of the body, and scrapings from the uterus if examined systematically reveal unexpected, or at least undiagnosed, malignancy sufficiently often to justify such examination as a routine measure. A diagnosis based upon the microscopic examination of scrapings never should be made, however, unless the examination has been performed by an expert pathologist; neither should a negative pathologic report be accepted as conclusive, as it is impossible to remove the entire endometrium with the curette. Routine microscopic examination should be made of tissue removed from the cervix during operations for the repair of laceration, erosion, or hypertrophy, as malignancy may be detected in this manner sufficiently early to enable a cure to be effected by radical operation.

A blood examination for the estimation of hæmoglobin, and a count of both red and white cells should be a routine practice upon patients who may be obliged to submit to an operation. A very low percentage of hæmoglobin, especially if due to long-continued or repeated hemorrhages, renders a patient a poor subject for a serious operation, and the detection of one of the primary anæmias would compel one to forego operation unless it were a positive necessity. While the leucocyte count is not depended upon to the exclusion of clinical evidence, it is one factor of value, not only in establishing a diagnosis but also in assisting in the determination of the treatment to be pursued. As a very general statement one may say that leucocytosis increases in proportion to the severity of the infection and the resistance offered unless the infection is so severe as to overcome the patient's resistance completely, in which event the leucocyte count may be normal or sub-normal.

Certain operative procedures, like salpingectomy for gonorrheal salpingitis, are best performed after the infection has become quiescent, and a constant leucocytosis would make one hesitate to operate so long as it continued. Well walled-off abscesses, even when they contain virulent micro-organisms, often give rise to no leucocytosis, so that absolute dependence cannot be placed upon this sign, but it will always carry a certain amount of weight when taken in connection with the other signs and symptoms presented.

The latest observations show that more dependence is to be placed upon the findings of a differential leucocyte count than upon the absolute increase in white cells and that increase in numbers is to be regarded as an index to the resistance of the patient, while a relative increase in the polymorphonuclear leucocytes bears more relation to the gravity of the infection. The polynuclear cells normally comprise from 60-70 per cent. of the total number of white cells, and if this proportion is increased to above 85 or 90 per cent., with a moderate general leucocytosis, it indicates a distinctly graver condition than does

a marked increase in the total number if the percentage of polynuclear cells remains relatively low.

Attempts have been made to establish certain definite rules for determining the gravity of an infection by the relative proportion of the various forms of leucocytes present, but aside from being cumbersome they have not proven accurate enough to justify their adoption. At the present time, laboratory examinations of the blood in pelvic infections are to be accepted as only one link in the chain of evidence of which the clinical perception of the examiner still forms the greater part.

Examination of the Urine.—Chemic and microscopic examination of the urine should be a routine procedure in gynæcology. While it may throw no light whatever upon the gynæcologic diagnosis of an individual case, a determination of the proper treatment to be pursued often is contingent upon a knowledge of the urinary condition present. In addition, the urinary findings frequently clear up the diagnosis of an obscure case in which the subjective symptoms of gynæcologic disease are present but examination of the pelvic organs reveals no abnormality, and in operative cases the selection of the anæsthetic is at times wholly dependent upon the urinary findings.

The total quantity of urine in 24 hours should be ascertained, but a catheterized specimen should be utilized for routine examination since contamination from vaginal discharges, either leucorrhœal or menstrual, is so frequent as to lead to the apprehension of a disease of the urinary organs when it does not exist.

Laboratory diagnosis formulated upon examination of the urine is upon a far better basis than a diagnosis based upon blood examination as the problems are not only simpler but better worked out. The interpretation of urinary findings, however, needs the same clinical intuition that is of value elsewhere, and there are but few diseases in which the urinary findings are positively pathognomonic. Diabetes, the various forms of nephritis, and infections and tuberculosis of the urinary

tract are the only disorders which can be definitely predicated upon the urinary findings alone.

It should be noted that in acute febrile disease albumen and hyaline casts do not necessarily mean nephritis, that blood and pus may come from any portion of the urinary tract, and that only the most expert are able to distinguish kidney epithelium from that of the ureter and deeper layers of the bladder, while the exact significance of bacilli of the colon group, without pus, is not understood.

Examination of the Bladder.—Examination of the interior of the bladder and securing of urine from the kidneys separately is easily accomplished in the female. The technique of cystoscopy should be acquired by any practitioner who expects to treat pelvic disease either as a specialty or a part of general medicine and surgery.

While the complicated and troublesome instruments necessary for male cystoscopy give equally good results in the female bladder, they are not required, as the simpler instruments and a very ordinary amount of dexterity and experience give satisfactory information in the female.

The interior of the female bladder may be inspected through the Kelly cystoscope by the aid of reflected light, or the short, electric-lighted, but direct-vision cystoscope may be used without the intervention of mirrors and lenses.

Before using either method the vulva should be cleansed, the urethra thoroughly cocainized, and preparation made to conduct the *entire* examination in an aseptic manner. For this reason cystoscopy is performed more satisfactorily in the hospital than in the office, although there is no reason why it should not take its place as a routine office procedure if the proper equipment is at hand.

Any method of performing cystoscopy demands distension of the bladder in order that the whole of its interior may be inspected, and also that the bladder be not burned if electrically lighted instruments are used.

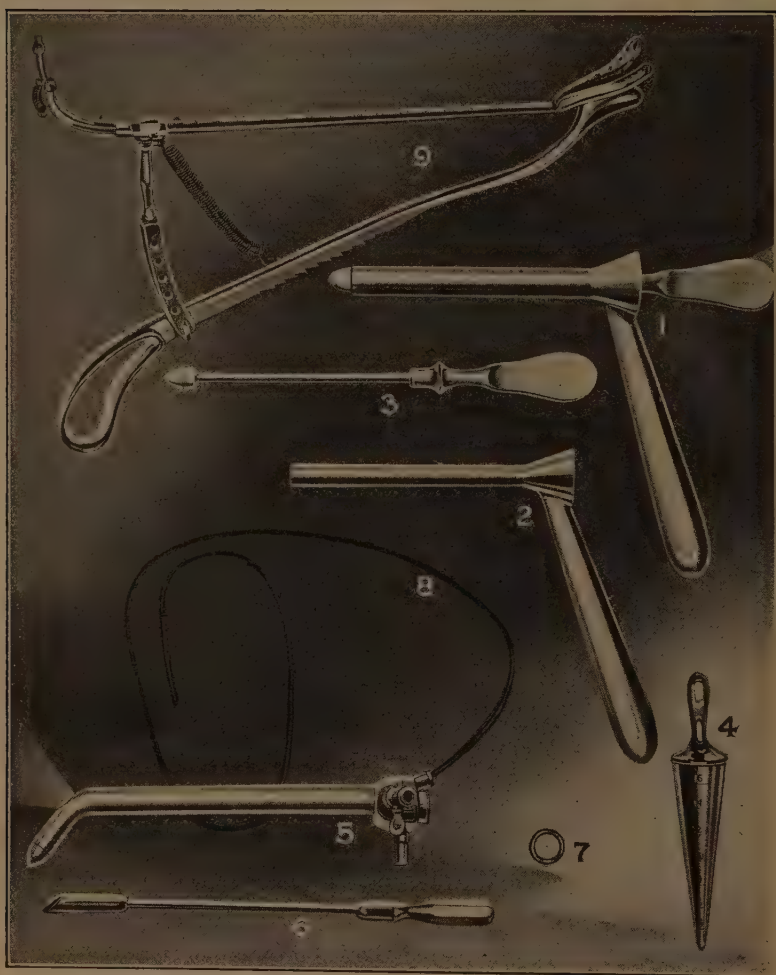


FIG. 33.—Instruments for examination of the bladder. 1, Kelly cystoscope with obturator in place; 2, Kelly cystoscope; 3, obturator; 4, urethral calibrator and dilator; 5, direct vision, electric lighted, air dilating, ureter catheterizing, female cystoscope; 6, obturator for same; 7, ocular window for same; 8, ureteral catheter; 9, Harris segregator. Split catheter partially open.

In using the Kelly method of inspection through a short endoscope, the bladder is automatically inflated by the aid of the knee-chest posture after all restraining bands have been removed from the waist and anterior abdominal wall. In this position the viscera gravitate toward the thorax, and relaxation of the anterior abdominal wall renders intra-abdominal pressure a *negative* instead of a positive factor. Thus when the urethra is opened air rushes into the bladder until it is thoroughly distended.

In all other methods either air or some watery solution is injected into the bladder, there being little choice between methods and instruments for this purpose, one examiner using air and another water as a matter of habit and experience. The air-dilating instruments possess some advantage when there is much bleeding or suppuration as the transparency of the dilating medium is not interfered with as it is when aqueous solutions are used.

Technique with Kelly Instruments.—The instruments required are a head mirror and a movable source of artificial light or an electrically lighted head mirror, a calibrator and dilator combined, endoscopic tubes of three sizes with obturators, a catheter and “sucker.” If ureteral work is contemplated a ureteral sound and ureteral catheters should be at hand.

With the patient in the dorsal position, the urethra is anæsthetized by inserting into it a small swab of cotton saturated with a 4 or 5 per cent. cocaine solution. Usually five minutes will suffice for this to be effected. Its caliber is then measured with the calibrator and if not sufficiently large it is dilated to the required size. The bladder is then emptied with the catheter, and this specimen is saved for examination and comparison with the urines obtained by ureteral catheterization if the latter is contemplated. The patient is then placed in the knee-chest posture and the endoscope introduced with the obturator in place. On withdrawal of the obturator, air fills the

bladder whose walls can then be viewed through the tube. The trigone and ureteral orifices should be inspected first. These are most readily found by slowly withdrawing the endoscope until the internal urethral orifice appears, then carefully pushing it back into the bladder a distance of 1 cm. The inter-ureteric ligament is usually visible at its middle, and by tracing it either to the right or left the corresponding ureteral orifice appears, sometimes as a slit, at others as a tiny dimple from which the urine is expelled in jets.

Sometimes it is difficult to bring the trigone into the field owing to an extreme distension of the bladder which crowds its base too far posteriorly, thus making it necessary to lower the outer end of the tube until the examiner's head is between the patient's thighs. This may be overcome, as Kelly has pointed out, by opening the vagina which then balloons up sufficiently to force the base of the bladder into its normal position.

If the ureteral orifices are not readily seen they may be found by careful use of the ureteral sound which searches for them at the ends of the inter-ureteric ligament.

It is impossible either to describe or picture the exact color of the normal mucosa of various portions of the bladder wall and this is learned only by experience, but a few examinations of the normal bladder enables one quickly to detect departures from health. Pus, abrasions, ulcers, and new growths are appreciated even by a novice.

After the completion of the examination the patient should resume the lithotomy position, and the catheter again should be passed in order to empty the bladder of its contained air as the latter is somewhat irritating and gives rise to uncomfortable burning and tenesmus if long retained.

For purposes of diagnosis this method still remains the easiest providing the examiner is skilled in the use of the head mirror.

Technique with Electrically Lighted Instruments.—As has been stated above the use of electrically lighted instruments necessitates either air or fluid as a dilating medium,

and for the latter a watery boric solution is found most satisfactory. Equally good results may be obtained with either, and preference is likely to be given to the one which the examiner first learned. A resistance coil must be thrown into the electric circuit if the ordinary lighting current is used, and this is furnished by cystoscope makers who must be informed regarding the strength of the current as well as its character. The manufacturers also supply portable dry cell batteries which make one independent of lighting currents and their vagaries. If the lighting current is used, the table, stool, and examiner should be insulated from the floor of the room by the use of rubber matting in order to prevent short-circuiting and grounding, which give annoying and sometimes painful shocks.

After cocainizing the urethra, dilating if necessary, and evacuating the bladder, the plan of procedure varies somewhat according to the instruments to be used. If an air-dilating instrument, it is slipped into the bladder without previous inflation. The obturator is withdrawn, the window on the ocular end of the instrument attached, an atomizer bulb slipped into place, and air pumped in until the patient is conscious of a feeling of distension. The light is now turned on and observation of the bladder wall made.

The inspection window should be kept in hot sterile water when not in use to prevent immediate steaming and obscuring of the field. If air escapes through the ureteral catheter openings, it may be replaced by gently squeezing the bulb. With this instrument care must be taken to turn off the light before allowing the bladder to collapse or it is certain to be burned. The same distension of the bladder can be obtained by placing the patient in the knee-chest posture, as in using the Kelly instruments, and no inspection window is then necessary.

If a fluid medium is to be used, the bladder is filled to the extent of 6 or 8 ounces before the introduction of the cystoscope, but some of this is lost during manipulations and must be replaced after the instrument is *in situ*. One advantage of the

latter instrument lies in the fact that observations can be made continuously until the work is finished, while it is rendered intermittent by steaming of the window if an air-dilating cystoscope is employed.

It should be remembered that with any of the methods described the picture shown is not magnified but is a direct plain view of the structures under observation. With a little practice the ureters may be catheterized without difficulty, but the danger of carrying infection as well as the confusion caused by bleeding from trauma to the ureter, has led the author to resort to segregation as the routine procedure in women. There are patients with symptoms of ureteral calculus, or ureteral stricture, or who have certain kidney lesions which necessitate the use of the ureteral catheter, but in women this instrument is unnecessary merely as a means of obtaining urine from the kidneys separately, since the elasticity of the base of the bladder readily permits the formation of a water shed by the vaginal lever of the segregator. Even in women, however, the results obtained may be misleading if there is much cystitis or local areas of ulceration, and these should be ruled out by inspection before the segregator is used.

The Harris Segregator.—This instrument works very satisfactorily, and although others are on the market which are said to be more accurate, the simplicity and perfect sterility of the Harris instrument gives it a wide field of usefulness.

With the patient in the lithotomy position the urethra is cocainized and the bladder evacuated. The instrument is introduced like a stiff catheter and the two halves rotated until the outer ends are in the same horizontal plane. The vaginal lever is now introduced, the vaginal portion resting between the two half catheters which are in the bladder, and these halves are then rotated still farther until the spring connecting their outer ends can be adjusted. The split vertical bar is now fastened on the catheter sheath, the outer end of the vaginal lever slipped into position between the two arms of the vertical

bar, the pin adjusted to keep it in position, and the spring is hooked onto the vaginal lever.

The shoulders of the patient should *not* be elevated when the segregator is used and the catheter sheath should be directly in the mid-line of the body. That portion of the instrument outside of the body is crudely represented by a triangle whose superior boundary is horizontal, the plane bounded by its sides being vertical.

The bladder is now washed out with boric solution to get rid of any blood which might flow from slight abrasions produced during the introduction of the instrument, and the first few drops which escape spontaneously after the washing is completed are thrown away. The suction apparatus is now attached and a partial vacuum produced in the bottles, after which the urine escapes as it is expelled from the ureters, in little spurts of from two to ten drops.

Sometimes temporary inhibition of kidney secretion is caused by the manipulations, and it may be some minutes before the urine appears although it can be hastened by having the patient drink one or two glasses of hot water after the apparatus is in place.

The most annoying feature of segregation is the length of time needed to secure satisfactory specimens for comparative examination, patients rarely leaving the table within an hour and suffering more from the enforced quiet than the discomfort caused by the instrument.

Segregation has its limitations and may be the source of an occasional error, but it can be performed without difficulty by any one who cares to spend an hour or two in becoming familiar with the instrument and technique, while its accuracy and value in every day use are surprising.

Cases requiring great diagnostic nicety and acumen should be referred to urological specialists, in whose hands ureteral catheterization, measurements of the capacity of the kidney

pelvis, collargol injections, and radiograms are matters of daily occurrence.

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CHAPTER IV

DISEASES AND INJURIES OF THE VULVA

The greater portion of the vulva is covered by skin, but at the inner surface of the labia minora this changes to a structure which closely resembles mucous membrane. It naturally follows that diseases affecting the vulva are those which might affect either the cutaneous or mucous surfaces of any other portion of the body, together with such conditions as are peculiar to the vulva because of its physiological functions and the functions of the organs in its immediate vicinity. As examples we may have eczema of the skin of the vulva, gonorrhea of the mucosa, injuries from copulation, or pruritus from the irritation of diabetic urine.

Vulvitis.—Inflammatory processes affecting the vulva may be of any degree of severity from the ordinary erythema of chafing to the violent inflammation of a virulent gonorrheal infection.

The causes of vulvitis are traumatism, chemical irritation, and infection.

Under traumatism are included chafing, scratching which may be induced by the itching of parasites or idiopathic pruritus, and excessive coitus and masturbation. Chemical sources are found in decomposing smegma, sebaceous secretions, and perspiration. Chemical irritation is probably the cause of the vulvitis produced by diabetic urine, urine or feces constantly escaping from fistulæ, the leucorrheal discharge of senile vaginitis and endometritis, and the acrid discharge from breaking-down carcinoma of the uterus.

Inoculation with infectious micro-organisms produces the same result here as elsewhere in the body, and erysipelas,

abscesses or furunculosis may be the outcome, but the most common of all inflammatory processes is gonorrheal inflammation of those portions of the vulva which are covered by mucous membrane. This, by reason of its irritating qualities, may set up a violent inflammation of the skin although the gonococci themselves proliferate upon the mucous surface only.

Symptoms.—Burning and smarting, increased by urination, is the first and predominant symptom of vulvitis. Severe throbbing is present in furunculosis and deep-seated inflammation such as abscess formation in the greater vestibular glands. In mild cases transient redness is present, but in severe forms there is a raw angry appearing excoriation. In children, noma, a form of gangrene of the vulva, is a rare but dangerous type of infection.

The discharge varies from an almost colorless serous exudate in early cases of mild type, to a thick creamy or greenish pus in the very severe forms. A distinctly purulent discharge almost invariably is gonorrheal, but in small delicate children pus may be present in the discharge without specific infection.

Infection of the greater vestibular glands and para-urethral ducts, and purulent infection of the urethra are almost without exception due to gonorrhea. In erysipelas no pus is present, but the rapid spread of the redness and its well-defined border are characteristic, as is its appearance during the puerperium. Diphtheritic vulvitis also is rare except during the puerperium, and that curious but violent form of infection giving rise to the so-called puerperal ulcer is found after labor only. Care must be taken to distinguish between diphtheritic and streptococcic exudate in instances of vulvitis characterized by the formation of membrane.

A microscopic examination should be made in every instance of purulent vulvitis, not only for the sake of a correct diagnosis but also in order that precautions may be taken against infecting others, and if gonococci are discovered the patient should be informed of the risk of accidental inoculation of her own eyes.

Herpes can scarcely be classified as an inflammation, but the subjective symptoms closely resemble those of vulvitis, and the scratching which herpes induces may readily set up the latter disorder. The appearance of any herpetic eruption is characteristic if observed before the irritation produced by scratching and rubbing the parts has interfered with the vesicles, which, when uninjured, appear like a series of small water blisters resting upon a moderately inflamed base.

Eczema of the vulva is often associated with eczema of other portions of the body and presents the usual phenomena of eczema elsewhere, viz., a papular or vesicular eruption which itches intensely, the appearance of a watery sticky secretion which dries into a scab, upon the removal of which a raw weeping surface remains. Very chronic types of eczema of the vulva are sometimes found in pruritus without eczema being present elsewhere.

Treatment.—Mild vulvitis, not produced in infection, subsides quickly if the source of irritation can be removed and the inflamed surfaces properly cleaned and protected. Cleanliness must be secured, but plain water acts as an irritant to an acutely inflamed skin so that boric acid solution, normal salt solution, or a weak solution of bicarbonate of sodium are preferable when secretions are to be removed. Gently wiping the surface with olive oil will cleanse it as well as washing with watery solutions, and it has the advantage of producing no irritation. Protection can be accomplished by simple ointments, such as Ung. aquæ rosæ, Ung. zinc oxid, and Acidi borici in Ung. simplex, and these are more efficient if applied upon gauze or cotton in such a manner as to separate the adjacent lips of the vulva. Protection may also be secured by the application of solutions of silver nitrate which form a film of albuminate of silver upon surfaces that are denuded of their epithelium, but silver nitrate applications sometimes are painful and on this account should be used with caution.

Such types of vulvitis as have their origin in incurable con-

ditions, like the discharge from advanced carcinoma of the cervix, can be palliated by the above methods, but cure is usually out of the question.

Gonorrheal vulvitis yields readily upon that portion of the mucous surface which is smooth and devoid of glands, but is recalcitrant to any treatment once it has extended to the urethra, para-urethral ducts, or ducts of the greater vestibular glands. Cleanliness is as essential in this type as in non-specific vulvitis, and the silver salts are the most reliable therapeutic agents. On surfaces such as the vaginal orifice, the vestibule, and inner surfaces of the labia minora, which are not exquisitely sensitive, painting with a 10 per cent. solution of silver nitrate once or twice weekly is effectual, while the weaker but non-irritating organic silver preparations may be used freely in the urethra. The para-urethral ducts should be laid open with a small knife and fused silver nitrate be applied upon a fine probe.

Vulvitis in small children is often gonorrheal in character, but that type of child which the older clinicians designated as "scrofulous," is peculiarly prone to non-specific vulvitis which does not yield until the existing mal-nutrition is overcome by fresh air, feeding, and iron.

Vulvitis caused by the ordinary pyogenic organisms should be treated here as pyogenic infection is treated elsewhere. Abscesses and furuncles should be opened, and if repeated recurrence takes place in spite of local treatment vaccination with an autogenous vaccine offers the most hope of cure.

Follicular Vulvitis.—A clear cut picture is usually presented by the form of vulvar inflammation which bears the above designation. Small pustules surrounded by a trifling red areola are seen scattered over the skin surface, and close examination reveals the orifice of a hair follicle at the summit of each pustule. The symptoms are those of vulvitis in general, and the treatment consists in evacuation of the contents of each pustule,

followed by cleansing and protection as in other forms of the disease.

Erysipelas, diphtheria, and puerperal ulcer are obstetric infections and are dealt with sufficiently in text-books on that subject.

Stenosis of the Vulva.—There are two forms of stenosis, the congenital and the acquired. Congenital stenosis is an anomaly of development and is discussed in Chap. XV.

Acquired stenosis may be the result of cicatricial contraction following severe injuries or burns, but is most frequently found in young children in whom the labia have become agglutinated, probably by reason of a very early vulvitis with subsequent adhesion of the apposed surfaces. Such adhesions are separated readily with the probe, and their re-formation is prevented by the introduction of gauze between the labia until the surfaces are completely covered with epithelium. Cicatricial stenosis is managed either by gradual dilatation or plastic operation, according to the degree of stenosis and extent of surface involved.

Pruritus Vulvæ.—Pruritus or itching of the vulva in most instances is purely symptomatic in character. It is found with parasites, pin worms, eczema, and kraurosis, as well as in early

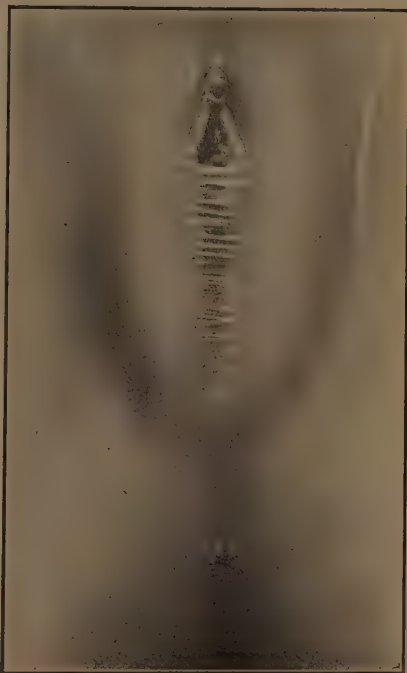


FIG. 34.—Acquired infantile stenosis of vulva due to adhesion of the labia.

vulvitis. In a few cases it seems to be a local neurosis when it is termed idiopathic, although Webster claims to have found microscopic changes in the nerve endings. A mild form is present in many women during menstruation and pregnancy. Severe and advanced cases always are associated with such skin changes that it is impossible to determine which disorder is primary and which secondary. The skin changes consist of a leather-like thickening with alternating folds and fissures, the skin being covered by a dirty gray epithelium.

No case should be considered as idiopathic until all sources of local irritation are excluded, and every case of pruritus in elderly women should be suspected of having a diabetic origin until the contrary is proven.

Treatment.—Pruritus, as such, needs treatment in instances in which no causative lesion can be discovered.

The itching produced by eczema, vulvitis, and other tangible causes is cured by attention to the primary lesion providing the latter is curable, but itching without visible skin changes is exceedingly intractable although it may be materially alleviated. The internal administration of nerve sedatives is of value as a palliative measure and in severe cases is necessary in order to secure sleep as the itching is most intense at night. Sponging with water as hot as can be borne allays the itching temporarily, and ointments containing cocaine or menthol are useful for the same purpose. The itching of diabetes is alleviated as the sugar in the urine diminishes under antidiabetic treatment.

If marked hypertrophy of the skin surface has occurred, painting with tr. of iodine at intervals of five or six days causes exfoliation of the thickened epidermis, and the same result may be secured by the daily application of a salicylic acid ointment containing 10 to 20 grains to the ounce. After exfoliation the skin sometimes remains normal for a considerable time and the intense itching is measurably relieved.

The Roentgen rays or radium applied by a skillful operator sometimes give great relief and result in an occasional cure.

In intractable cases in which the suffering is unbearable the affected skin surfaces may be removed and the raw area be covered by flaps of healthy skin drawn from the vicinity by means of a plastic operation.

Kraurosis Vulvæ.—This fortunately rare disease is undoubtedly of trophic origin and consists of an atrophy of the skin about the vulva. It is infrequent before the menopause, and in young women is one of the undesirable results which sometimes follows the induction of the premature menopause by the removal of the ovaries. The labia become flattened, the clitoris atrophic, and the vaginal entrance narrowed, sometimes to such a degree that coitus is impossible. The appearance of the parts suggest senile atrophy carried to its ultimate conclusion. Pruritus and burning are sometimes complained of. The condition is incurable by medical treatment and if the annoyance is severe the affected areas may be removed as in intractable pruritus.

Chancre.—Vulvar chancre is found most frequently on the labia majora and fourchette although any part of the external genitalia may be infected.

The true, hard, or Hunterian chancre appears in from two to six weeks after exposure, and the infection is inoculated through an abrasion on the skin or mucous surface, this abrasion usually being healed before the specific sore appears. Typically the first lesion is a hard papule, brownish in color, which gradually becomes eroded on its surface while the circumference increases in hardness.

In some instances no surface erosion occurs, the papule remaining hard, dry, and scaly during its entire existence, while in others the erosion deepens into a distinct ulcer.

The characteristic features of the true chancre are its long period of incubation, its painlessness, and its distinct induration. While it is never safe to diagnose syphilis, even from a perfectly

characteristic chancre, the specific nature of such a lesion may be considered as tentatively correct if the inguinal lymphatics draining the area involved show painless hard enlargement of one or more glands, this *induration progressing paripassu with the induration of the primary sore*.

Discovery of the parasite, the spirochete pallida, in the secretion or scrapings from the surface of the sore is positive evidence of its specific character. General lymphatic enlargement and the typical skin eruption render the diagnosis certain, but by the time these secondary symptoms make their appearance the primary sore may have disappeared. While by some it is thought better to await secondary manifestations before instituting treatment, it is imperative to arrive at a diagnosis as soon as possible after the appearance of the primary sore in order that the infected individual may be warned of the risk of conveying infection to others, and the early discovery of the parasite now renders this possible even before the Wassermann reaction is available as a diagnostic resource.

Treatment.—The general treatment of syphilis is dealt with at length in text-books upon that subject. There is some difference of opinion as to whether chancre is merely the first manifestation of a general syphilitic infection and whether, therefore, local treatment has any effect upon the disease, but it is important that no irritation be produced by the use of caustics as they do no good and may set up an intractable phagedenic ulceration. Attention to cleanliness, daily cleansing with weak bichloride solution, or the use of calomel as a dusting powder may be all that is called for in the way of attention to the primary vulvar sore, although some syphilographers are in favor of excision as the surest means of removing a concentrated accumulation of spirochetes from the body. Altogether it seems likely that excision of the chancre, together with the earliest possible administration of salvarsan or neo-salvarsan by approved methods, is the safest and surest means of eliminating the primary sore and starting the patient on the road to

recovery from syphilitic infection. There is constantly accumulating evidence that none of the arsenical preparations, no matter how used, are permanently and definitely curative in syphilis. That they cause rapid disappearance of primary and secondary lesions is incontestable, but a permanent cure without the danger of future recurrence of symptoms, or late manifestations of syphilis of the central nervous system, is not to be secured without resort to mercury, possibly over as long a period as was thought necessary before Salvarsan was brought out.

Chancroid.—The soft chancre, or chancroid, offers a marked contrast to the true primary syphilitic sore. Whether chancroid is caused by a specific organism or by inoculation with the ordinary pus-producing organisms is not definitely known, but its behavior is so much at variance with the lesions caused by staphylococci for example, that it seems probable it is a disease by itself with a specific germ, the bacillus Ducrey, as its cause. The spirochete of syphilis is never found in the secretions from the soft chancre.

Chancroid makes its appearance in from two to five days after exposure as a small painful pustule which rapidly assumes the characteristics of an ulcer with sharp-cut edges. Its base has a dirty necrotic appearance, and it secretes a thin purulent discharge. These ulcers are frequently multiple and are auto-inoculable, in both of which respects they are unlike true chancre. Chancroid may remain as a distinct round ulcer, spread superficially over the surface, or produce deep sloughing. Lymphadenitis of the inguinal chain of glands may take place with suppuration and necrosis, a condition which is known as chancroidal bubo.

Treatment.—Mild forms of chancroid heal in a few days under local antiseptic treatment, with care to prevent contact of the discharge with other portions of the vulva. The parts should be washed with 1-2000 or 1-3000 bichloride of mercury solution several times daily, then dried and dusted with a powder composed of one part of calomel to four or five of bismuth sub-

nitrate, and the labia kept apart with a piece of absorbent cotton covered with the same powder.

Serpiginous or phagedenic ulceration should be met by thorough destruction of the base of the ulcer, a form of treatment which is so painful as to necessitate local and at times even general anæsthesia. Pure carbolic acid applied to the ulcer only and neutralized within one minute by alcohol, or in the worst cases destruction of the ulcer by the actual cautery, is demanded. This should be followed by the constant application of compresses moistened with boric acid or weak bichloride solution. Such radical treatment should be used but once, but the destruction should be thorough and complete.

Condylomata.—Condylomata are of two forms, flat and acuminate.

The flat condylomata are true syphilitic lesions and are nothing more or less than the mucous patches which are so familiar as a late secondary syphilitic manifestation in the mouth and throat, and their intensely infectious character must be borne in mind. The treatment is that of syphilis in general, together with the local application once or twice a week of silver nitrate solution in the strength of from 10 to 20 grains to the ounce. The parts affected should be bathed frequently with a weak bichloride of mercury solution in the interval between treatments.

Pointed or acuminate condylomata are warty vegetations due to hypertrophy of the papillary layer of the skin and are found most frequently in patients who have gonorrhea although by no means confined to them. They may be situated upon any portion of the vulva and in bad cases they not only cover the vulva but spread to surrounding parts. Their color varies from a dull grayish pink to a bright red, depending upon the blood supply, and their general shape and appearance is that of moist succulent warts, sometimes pedunculated but usually sessile. Although commonly known as venereal warts and often occurring during gonorrhea and sometimes during syphilis,



FIG. 35.—Acuminate condylomata.

they are diagnostic of neither disease and may occur in persons entirely free from venereal taint.

Treatment.—Small venereal warts will frequently disappear if powdered with calomel or alum and kept perfectly dry. Pedunculated growths may be snipped off but are likely to recur unless their bases are cauterized. The removal of extensive condylomatous masses is rather formidable on account of the



FIG. 36.—Acute Bartholinian abscess.

profuse hemorrhage and should be undertaken only under general anæsthesia. As they are soft they may be removed with the scissors and sharp curette and the bleeding controlled by hot sponging and pressure. Every recurrence should be met by prompt removal and cauterization. While chemical caustics, such as glacial acetic acid, chromic acid, nitric acid, etc., are useful, the actual cautery lightly applied is just as efficient and its effects are far more easily controlled.

Bartholinitis.—Inflammation of the greater vestibular gland and duct is almost pathognomonic of gonorrheal infection. During acute gonorrheal vulvitis the outlet of the duct, just outside of the remnants of the hymen, may often be seen discharging pus. After the subsidence of the acute inflammation, its telltale mark is left for an indefinite period in the shape of a tiny red areola about the orifice of the duct.

Acute inflammation of the gland itself takes place as the result of extension from the duct, and if the latter becomes

occluded an abscess of the gland results. Such an abscess may evacuate itself through the duct, but more frequently it breaks, either just within or without the vulvar orifice with immediate relief from all symptoms. Recurrence takes place sooner or later so that a series of abscesses is the rule unless radical treatment is instituted.

Symptoms.—The typical symptoms of acute inflammation are present in the affected gland. The labium of the corresponding side is much swollen owing to its loose texture, and this swelling extends well up into the vagina on the same side. The pain is severe from the onset and is greatly aggravated by standing and walking. The condition can scarcely be mistaken for anything else if the shape and location of the gland are borne in mind.

Treatment.—Under the use of hot compresses the duct may re-open and the abscess evacuate itself, but such an outcome is unusual. Free incision is indicated through the most tense portion of the swelling, either on the inner side of the labium or just within the hymen. This may be done under local anæsthesia in most instances but in very nervous patients general anæsthesia is necessary. It is sometimes advised to extirpate the gland, but the after-effects are less painful and the risks of severe infection minimized if extirpation is deferred until the acute inflammation has been overcome by preliminary evacuation of the pus.

Inasmuch as recurrence is the rule, eventual removal of the gland should be practised whether it has been incised or opened spontaneously, as should also be done in chronic infection which leads either to palpable thickening of the gland or its conversion into a cyst.

For this operation general anæsthesia is necessary. An incision is made down the inner side of the labium and the gland dissected out intact if possible. Bleeding from the veins of the vestibule is free and is checked by suturing the bleeding points at the bottom of the wound. The incision

should be closed with superficial sutures leaving the lower end of the wound open for drainage. If all of the gland cannot be removed that portion which is left should be disinfected with pure carbolic acid, neutralized with alcohol, and the entire wound packed and allowed to granulate from the bottom.

Tumors.—Tumors of the vulva are relatively rare. They comprise such tumors as arise in similar histological structures elsewhere in the body. Lipomata, fibromata, epitheliomata, and sarcomata may occur. Sebaceous cysts, masses of varicose veins, hydrocele of the canal of Nuck, and hernia extending into the labium all give rise to enlargements not composed of new tissue, but simulating tumor formation.

Lipomata may be distinguished here as elsewhere by their peculiar consistency, lobulated form, and the pig-skin appearance over them when traction is made. Fibromata are hard and usually more or less pedunculated. Sarcomata are very rare and usually melanotic in character. Epitheliomata are usually wart-like, covered with a scab in their very earliest stages, and grow rapidly as hard infiltrating tumors which break down as they advance. There is coincident enlargement of the neighboring lymph glands.

Sebaceous cysts are somewhat difficult to distinguish. They are movable, encapsulated, not lobulated, semi-fluctuating, and moreover the opening of the duct may sometimes be distinguished upon the surface.

Varicose veins are readily diagnosed by their color, prominence when the patient assumes the standing position, and compressibility.

Hydrocele of the canal of Nuck manifests itself as a fluctuating swelling, not disappearing upon pressure, which follows the line of the round ligament into the inguinal canal.

Inguinal hernia extending into the labium is usually reducible, gives an impulse on coughing, and its neck can be traced into the inguinal canal.

The benign tumors, sebaceous cysts, and hydrocele of the

canal of Nuck may all be treated by excision if troublesome. Varicose veins may be ligated under the same circumstances.

Malignant growths should be removed far beyond their apparent limits if dissemination has not already occurred. In cancer the inguinal lands must be removed simultaneously, but without much hope of success if they are palpably enlarged. Involvement of the liver or melanotic patches elsewhere upon the body renders operation for sarcomata perfectly useless. Inoperable malignant growths should be submitted to X-ray or radium treatment. Such treatment usually fails but an occasional cure fully justifies its use.

Urethral Caruncle.—The name urethral caruncle is applied to a small tumor which makes its appearance at the external orifice of the urethra. In appearance it is not unlike a red raspberry, and it is usually attached to the wall of the urethra by a sessile base. Two varieties are noted clinically, one of which is excessively painful. The other is not so painful but bleeds freely when handled. They may appear at any time of life although somewhat more frequent after the menopause. They must be distinguished from prolapse of the urethral mucosa, the swelling from the latter being perceptible about the entire ring of the external urethral orifice, while caruncles spring from a distinct base which occupies only a portion of its circumference.

The treatment is excision of the tumor down to healthy tissue and suture of the resulting wound if large or cauterization if the base is small. Local anæsthesia may be used if the base is small, but general anæsthesia is required when it is large. There is no portion of the body in which cocaine anæsthesia should be used more circumspectly than about the urethra, and in large vascular caruncles its use hypodermatically is distinctly dangerous. The wound left is often much larger than would be expected, and the hemorrhage difficult to control even by suture as the tissues are friable and deep sutures may occlude the urethra.

Vaginismus.—Vaginismus is a spasm of the muscles which close the vaginal orifice. In its pure form it is strictly a neurosis which manifests itself whenever coitus is attempted, thus making

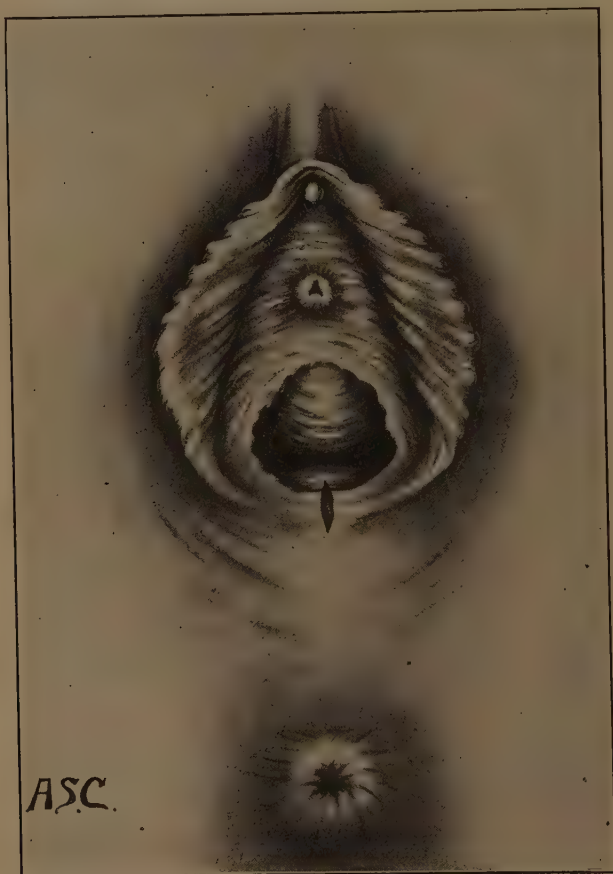


FIG. 37.—Hirst's operation for vaginismus. An incision is made in each vaginal sulcus which meet in the midline at the fourchette and extend posteriorly toward the anus.

penetration by the male organ impossible. In some instances attempts at digital or specular examination are rendered difficult or impossible, the vaginal orifice contracting spasmodically

whenever approached. The spasm is always severe enough to be painful and is often positively unbearable. In extreme cases the muscles of the anterior abdominal wall are spas-

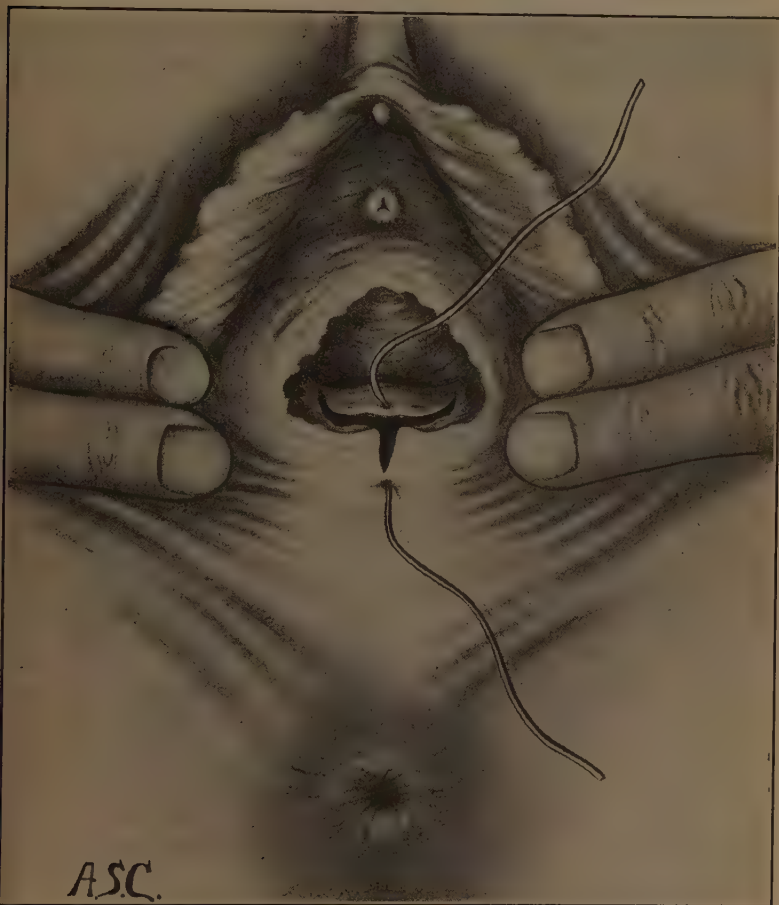


FIG. 38.—Hirst's operation for vaginismus. The incisions are sutured transversely. First suture inserted.

modically contracted as well as those of the vulva. A much milder form of spasm is met with occasionally in affections of the genitalia which render intercourse painful, the spasm under

these circumstances being protective in character. This is sometimes found with urethral caruncle, vulvitis, inflamed remnants of the hymen, kraurosis vulvæ, and inflammation or prolapse of the tubes and ovaries.

Treatment.—A careful search should be made for any organic lesions which might be responsible for painful intercourse. The



FIG. 39.—Hirst's operation for vaginismus. All sutures inserted.

cure of such a lesion results in the cure of the spasm. Particular attention should be given to the small tags left after rupture of the hymen, as these are sometimes as sensitive as neuromata, and also to the possibility of a prolapsed ovary, which, as pointed out by Sutton and Giles, is always hyperæsthetic.

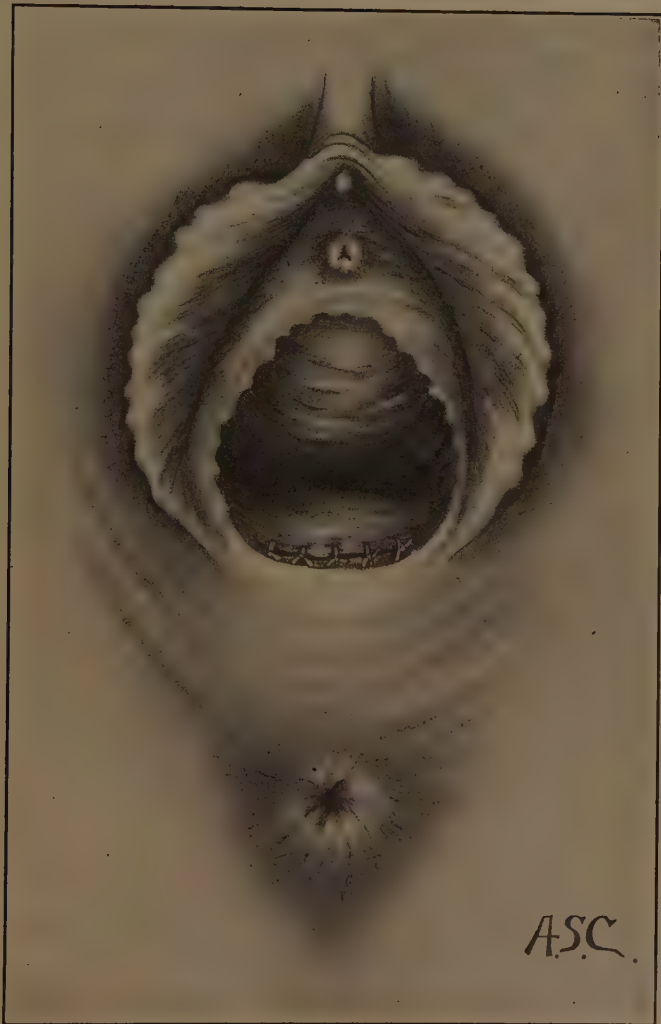


FIG. 40.—Hirst's operation for vaginismus. All sutures tied. The vulva gapes.

The neurotic cases are sometimes psychic in their origin, and one successful intercourse may cause permanent cessation of the trouble merely by demonstrating that intercourse is possible. In the greater number of instances an operation is required which will diminish the power of the muscles concerned in the spasm, and this is accomplished by a simple operation described by Hirst.

An incision is made in each vaginal sulcus extending an inch or more up the vaginal wall, the two incisions meeting externally in the mid-line at the fourchette. These incisions are sufficiently deep to sever the anterior edge of the levator muscles. From the fourchette a single incision extends in the mid-line outward and posteriorly toward the anus. When these incisions are completed they resemble a small median perineal laceration with an extension upward along each sulcus. The incisions are then sutured transversely, and the author can verify Hirst's statement that even the most intractable cases are cured by its performance.

Parasites.—The pediculosis pubis or crab louse is the commonest parasite infesting the external genitalia. It is somewhat larger than the ordinary head louse and considerably broader, its shape giving rise to the vulgar name of crab. The nits are deposited upon the hairs near their bases and are closely glued to them. Not only the hair on the mons pubis, but the eyebrows, axillary hair, and that upon the legs may become infected.

The parasites may be acquired through sexual intercourse, from toilet seats, and even from public conveyances. Their presence gives rise to intense itching and sometimes to curious bluish areas upon the skin known as maculæ cerulæ. Inspection alone discloses the presence of nits upon the hair of the region involved.

The treatment is frequent bathing of the affected parts with solutions of bichloride of mercury in the strength of from $\frac{1}{250}$ to $\frac{1}{500}$ provided the area involved is not too great. Ung.

hydrarg. is also effectual but nasty, and sometimes irritating to sensitive skins.

The pin worm or oxyuris vermicularis occasionally migrates from the anus to the vulva, where it may be seen as a narrow white thread usually less than 1 cm. in length. Treatment should be directed to its original seat in the large intestine by means of enemata of infusion of quassia, while those worms which have migrated may be destroyed by the external application of bichloride solutions as recommended for pediculosis.

Injuries of the vulva may be caused by kicks or blows, by falling astride of blunt or sharp objects, by forcible coitus, and by parturition.

Injuries during parturition are usually associated with other and more important injuries to the vaginal outlet and pelvic diaphragm.

All injuries to the vulva, however produced, fall naturally into the surgical classification of incised, lacerated, and contused wounds, and their importance is dependent largely upon the vascularity of the parts and the hemorrhage which ensues upon injury. Contusions of the vulva produced by blunt force often rupture some of the veins, and owing to the softness and elasticity of the tissues there may be an enormous hæmatoma with no external wound.

Open injuries about the region of the urethra and vestibule may result in excessive external hemorrhage from rupture of the veins of the bulb. This is likely to take place during a difficult labor and the resulting bleeding is one of the overlooked sources of post-partum hemorrhage.

Laceration of the hymen during the first intercourse may be responsible for prolonged and persistent hemorrhage, and attempted rape upon young girls is productive of severe laceration and serious blood loss.

Treatment.—Hæmatomata should be treated by rest and pressure until it is apparent whether or no they will be absorbed. If absorption does not occur, they should be evacuated under

rigid aseptic precautions. The treatment of open wounds depends upon their character. Clean cut wounds should be sutured if aseptic, and drained if their condition is in doubt. Owing to the free blood supply, suturing of wounds, even when there is considerable bruising and damage to the surrounding tissues, is permissible about the vulva providing infection is not present. Isolated vessels should be ligatured, but deep catgut sutures most readily control the bleeding which sometimes seems to proceed from all portions of vulvar wounds.

Lacerations produced by labor ordinarily should be repaired at once, together with the associated injuries to the pelvic floor.

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CHAPTER V

INJURIES TO THE PERINEUM AND PELVIC DIAPHRAGM

Before taking up the study of injuries to the pelvic diaphragm the student should refer to the anatomy of the parts and fix in mind the fact that the term "perineal body" applies to a limited portion of that structure only. Unless this is done much confusion is likely to result because of the popular use of the phrase "laceration of the perineum," which is applied not only to injuries which involve the perineal body, but also to those involving the more important levator ani muscles and the fascia covering them. The latter injuries frequently extend far up the posterior and lateral walls of the vagina and may not involve the perineal body at all. Injuries to the anterior vaginal wall and the vesico-vaginal plate of fascia are quite as productive of trouble as those of the posterior wall, but they are often unrecognized at the time of their occurrence because they are likely to be sub-mucous rather than open.

"Laceration of the perineum" applies to tears which invade any part of the true anatomical perineum, and the term is not limited to the physiologically insignificant injuries that involve the small body of tissue lying between the anus and vulvar orifice.

TYPES OF INJURY

Perineal lacerations are divided into complete and incomplete according to whether the sphincter ani muscle is or is not divided.

Incomplete lacerations are of two distinct types. The first begins on the posterior vaginal wall just within the hymen,

extends through the fourchette, and separates the two halves of the perineal body, dividing the external skin for a variable distance toward, but not through, the sphincter ani. This tear is fairly in the median line and if unrepaired leaves a gaping vaginal introitus, but it in no way involves the supporting structures of the pelvic diaphragm and is therefore physiologically unimportant.

The second begins higher up in one or both vaginal sulci and extends downward to the perineal body, where it turns toward the mid-line. Here it may end without passing through the skin, but more commonly it splits the perineal body in the same manner as the first and extends for a variable distance toward the anus. This form of laceration may penetrate the mucous membrane and skin only, or it may go more deeply, tearing through the levator and its fascia. When internal only, that is, when it does not pass through the skin, it is overlooked almost without exception. If unrepaired this tear deprives the rectum of its support and causes the anus to drop backward beyond its normal distance from the posterior edge of the pubis. Intra-abdominal pressure then operates upon an orifice imperfectly closed and the various forms of prolapse of the pelvic structures are initiated.

Other injuries to the structures at the pelvic outlet may be sustained in connection with these, but they are much less common. The perineal body may be forced away from the vagina, the resulting tear being transverse, and the lateral ends of such a laceration may extend high up into the labium on either side. The fascia between the vagina and bladder may be torn without injury to the vaginal mucosa, and a tear may start in the space between the urethra and superior ramus, extending into the vestibular bulb and giving rise to severe hemorrhage at the time of its occurrence.

A complete laceration is merely an extension of a simple, incomplete, mid-line tear through the sphincter of the anus. If the injury is severe, it may extend for an inch or more up

the recto-vaginal septum, but very rarely is it associated with the characteristic second form of incomplete tear. This accounts for the clinical fact that complete perineal laceration is but infrequently complicated by prolapse of the uterus, cystocele, or rectocele, the fundamental disability being limited to incontinence of gas and feces.

Etiology.—Injuries to the pelvic floor usually are produced during the passage of the foetal head, but they may be caused by rapid forcible delivery of the shoulders, or an insignificant tear may be converted into a deep one in the same manner. A large head or small vagina predisposes to injury. Persistent occipito-posterior position makes injury more probable by presenting a larger diameter of the foetal head for engagement at the pelvic outlet.

Forcible delivery and delivery early in the second stage before the soft parts have become thoroughly dilated are prolific sources of laceration. The forceps blades may cut into the vaginal wall and so initiate a tear which becomes very extensive by its continuation externally.

As has been stated, complete lacerations usually are in the mid-line and are not associated with deep lateral tears, the probable explanation lying in the fact that lateral tears which pass through the levator allow the rectum to drop posteriorly and thus escape injury. Ordinary complete tears seem to be caused by rapid escape of the head just as it is being delivered, the force which starts the tear acting excessively at this point by reason of the suddenness of the expulsion.

Secondary Results.—As severed muscles tend to retract, the surfaces which are torn apart remain separated, and the healing process consists in epithelization of such raw surfaces as are left rather than their proper union. If the tear is small and in the median line no harm results. If through the anal sphincter, its ends retract until that muscle forms a straight line posterior to the anus. If the injury involves the supporting structures, the anus is displaced posteriorly, the anterior and

posterior vaginal walls no longer are held in contact, and a relaxed vaginal outlet is the result.

If a woman with a normal pelvic floor be examined in the standing position and asked to strain or bear down, the posterior and anterior vaginal walls will be found firmly in contact with each other. If one with an injured pelvic floor is examined



FIG. 41.—Secondary result of injury to pelvic diaphragm. Huge cystocele, beginning rectocele.

under the same circumstances, a protrusion is noticed either of the bladder anteriorly, the rectum posteriorly, or both.

The anterior protrusion consists of the posterior bladder wall, covered by vaginal mucosa. This protrusion is known as a cystocele and may be caused by the loss of support normally

accorded to the bladder by the fascia between the latter viscus and the vagina. In other instances the posterior vaginal wall fails to hug the anterior vaginal wall for the reason given above, *i.e.*, injury to the levator, and descent of the bladder is inevitable whenever intra-abdominal pressure is increased by straining at stool, lifting, or reaching. Once the protrusion is started it tends to grow larger through the constant stretching and thinning of its tissues, and after the menopause atrophy of the muscles accelerates the process. As the bladder is attached firmly to the cervix throughout its supra-vaginal portion, the latter is drawn anteriorly beyond its normal location and eventually follows the bladder to the vulva, while the fundus tips posteriorly as a consequence.

At first the symptoms are slight and may consist only of some bladder irritability. Later there is a feeling of loss of support and dragging in the pelvis, with difficulty in completely evacuating the bladder, but these are usually ignored until the protruding mass attracts the patient's attention. Imperfect emptying of the bladder may result in decomposition of the urine and cystitis, and the impossibility of keeping the parts clean leads to a persistent odor of decomposing urine. Ulceration of the protruding vaginal wall may take place but is not so common as ulceration of the cervix when uterine prolapse is present.

When the cystocele is of moderate size no protrusion may be apparent with the patient in the dorsal position, and it is brought to view only by straining efforts during which more and more of the anterior vaginal wall is everted through the vulvar ring. Digital examination shows partial or entire absence of the strong sling of levator on either side of the vagina, and if further evidence of the character of the protrusion is needed it may be secured by passing a sound through the urethra into the prolapsed bladder.

The treatment is anterior colporrhaphy and perineorrhaphy as described on pages 132 to 152.

Rectocele, or protrusion of the rectum covered by the posterior vaginal wall, is frequently but not necessarily associated with cystocele, and is only occasionally found alone. The mechanism of its production is similar except that injury to the



FIG. 42.—Secondary results of injury to pelvic diaphragm. "Digital examination shows partial or entire absence of the strong sling of levator on either side of the vagina."

anterior segment of the pelvic floor is not a necessary antecedent. Posterior displacement of the anus causes the fecal mass to impinge upon the anterior rectal wall during defecation, and thus tends to drive the rectum through the vulvar orifice which

is itself imperfectly closed. The patient's attention may be directed to this by difficulty in evacuating the bowels, and in extreme cases she is forced to hold the rectum back with the fingers in the vagina before it can be emptied.

The nature of the protrusion is evident at a glance but may be confirmed by rectal examination if necessary.



FIG. 43.—Repair of recent small, incomplete perineal laceration. Sutures passed from skin surface but penetrate to bottom of wound.

Immediate Repair of Perineal Injuries.—Repair of all injuries to the pelvic floor should be made at once unless the tissues are in such condition that sloughing is to be expected, or infection has certainly taken place. By immediate repair

is meant repair at so early a time after receipt of injury that denudation is unnecessary, usually within 24 hours. The object sought is the return of the separated tissues to their original location, not the concealment of injuries by cleverly placed external sutures. Small median lacerations are sutured



FIG. 44.—Repair of recent small incomplete midline laceration. "If the wound extends high in the vagina sutures on the vaginal surface are necessary." They should penetrate to the bottom of the wound.

to prevent infection and more extensive injuries to secure a return to normal of the functions of the involved muscles.

The *small median* laceration is repaired by inserting as many sutures from the skin surface as may be required to secure

coaptation. Usually but two or three are needed for this purpose but they should pass to the bottom of the wound. If the wound extends too high in the vagina for satisfactory closure in this manner, one or two sutures on the vaginal surface



FIG. 45.—Repair of recent small incomplete midline perineal laceration. Skin sutures are tied and approximate depths of wound.

are necessary. If the stitches are passed very soon after delivery no anæsthetic is required.

The immediate repair of complicated lacerations, those extending into the vaginal sulci or passing through the recto-vaginal septum, should be viewed as a distinct surgical operation to be carried out under thorough aseptic precautions, in a good

light, and with plenty of assistance. An anæsthetic is needed unless the patient has unusual fortitude. The hurried repair of bad perineal tears immediately after delivery, and while the patient and attendant are both exhausted, needs only be mentioned to be condemned.



FIG. 46.—Immediate repair of small complete laceration. The deep retention stitch is in place *behind* the sphincter ends. One catgut suture is laid in sphincter ends for greater security.

The upper portion of the vagina should be packed with sterile gauze to prevent obscuring of the field by blood escaping from the uterus, and the entire injured area should be inspected thoroughly with the labia separated, in order to ascertain the

extent and character of the damage. The first suture should be placed upon the vaginal surface *beginning at the apex* of the wound in the vagina. Sometimes it is impossible to reach so high with the first stitch and in that event one may be placed as



FIG. 47.—Immediate repair of small complete perineal laceration. The deep retention stitch is tied and knot has disappeared in anus. Additional catgut stitch now to be tied.

high as possible and left long, when traction upon its ends will expose the upper portion of the tear. The sutures are interrupted rather than continuous, *they should penetrate to the bottom of the wound*, and be close enough together to approximate the

entire surface. The last vaginal stitch should be 1 to 2 cm. from the external surface, after which the remainder of the laceration may be closed by sutures passed from the skin side.

Complete lacerations are first converted into incomplete and then sutured as above. This conversion is readily accomplished, in tears which do not extend up the recto-vaginal septum but pass through the sphincter only, by the introduction of one suture which enters the skin well *behind* the end of the external sphincter muscle on one side, emerges on the raw surface *above* the apex of the wound in the rectal mucosa, is immediately re-introduced, and emerges on the skin surface *behind* the other end of the sphincter. Traction on this stitch before it is tied shows that the ends of the sphincter are brought to the front of the rectum where they belong, and usually it coacts them perfectly. For the sake of additional security one or two catgut sutures may be buried in the apposed ends of the sphincter muscle. After the bowel is closed the vaginal injury is repaired as in the incomplete tear.

If the recto-vaginal septum is torn well above the sphincter, the septum is first repaired by suturing the rectal mucosa from above downward. The stitches thus closing the septum should be introduced from the rectal side, should be very fine, close together, and should penetrate the rectal mucosa only. This line of sutures ends just above the sphincter and it will be found that the injury has been converted into the type above described. The deep suture behind the ends of the retracted sphincter now completes the closure of the bowel and there remains the ordinary incomplete laceration to be closed as before.

Suture Material.—Silk, silkworm gut, silver wire, and chromic catgut may all be successfully used in repairing perineal injuries, but for reasons given in Chap. XIX, silkworm gut or wire is preferred for the skin. The vaginal sutures are best made of No. 1 or No. 2 chromic gut to obviate the necessity for distending the vagina during their removal, and the rectal sutures are pref-

erably made with silk because a very fine needle and thread can be used with this material. The smaller the perforation in the rectal mucosa, the less the risk of deep infection of the united septum, and the silk suture comes away spontaneously after the patient has recovered.

THE SECONDARY REPAIR OF PERINEAL INJURIES

INCOMPLETE LACERATION; ANTERIOR COLPORRHAPHY, PERINEORRHAPHY

Anterior colporrhaphy is usually performed at the same sitting as perineorrhaphy because injury to the anterior or pubic segment of the perineum is so frequently found in association with injury to the posterior or perineal segment. Even if no injury to the posterior segment has occurred, the outlet is likely to have become dilated by the constant wedge-like action of the prolapsed bladder when the anterior segment has suffered sufficiently to permit the formation of a cystocele.

Many anterior colporrhaphies have been devised for the cure of cystocele but the really valuable ones are few. A defect which is common to many is superficial denudation, the vaginal mucosa only being removed, while the efficient operations have two factors in common: (1) Denudation extends to the bladder wall. (2) The deep structures laterally are drawn to the median line and so sutured that the line of union is longitudinal, and not a mere pucker on the anterior vaginal wall.

After drawing down the cervix, denudation may be accomplished by one of two methods: (A) The area of anterior vaginal wall to be resected is outlined by scratching with a sharp knife, the flap so outlined seized with forceps at its anterior end, and the incision at this point carried through the thickness of the vaginal wall. The bladder is then wiped from the vaginal flap, the incision at either side of the flap prolonged through the vaginal wall so far as the separation of the vagina from the bladder has proceeded, the bladder wall again pushed away,

the incision again extended, until the flap as outlined is separated to the posterior transverse scratch, when this is cut across and the flap removed. (B) A longitudinal incision is made from the level of the internal urethral orifice to the cervico-vaginal junction. This incision penetrates through the vaginal wall

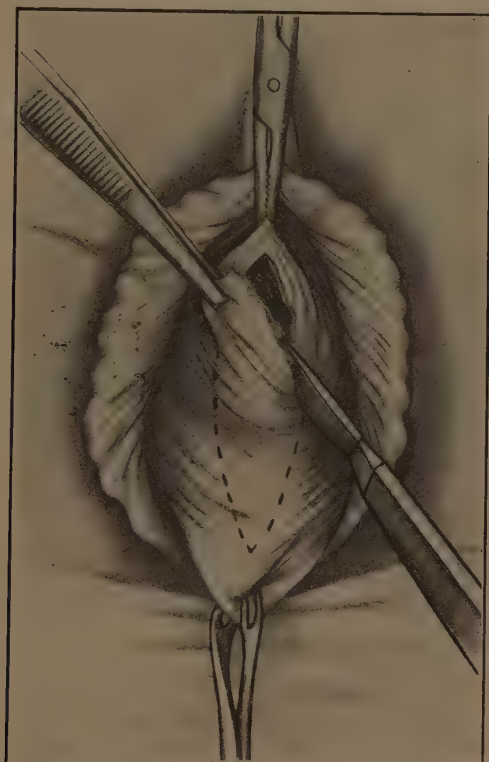


FIG. 48.—Anterior colporrhaphy. Method A. "The area to be resected is outlined" and "the flap so outlined is seized with forceps at its anterior end."

to the bladder. The vaginal tissue on either side of this incision is seized with forceps and the bladder dissected away from it with the finger covered with gauze, aided occasionally by a snip with the scissors. If the proper plane is reached between the bladder and vaginal wall this may be accomplished in a

moment, and the bladder pushed away to the lateral walls of the vagina and separated both anteriorly and posteriorly to the desired extent. No tissue is removed at this stage of the operation when method *B* is followed.

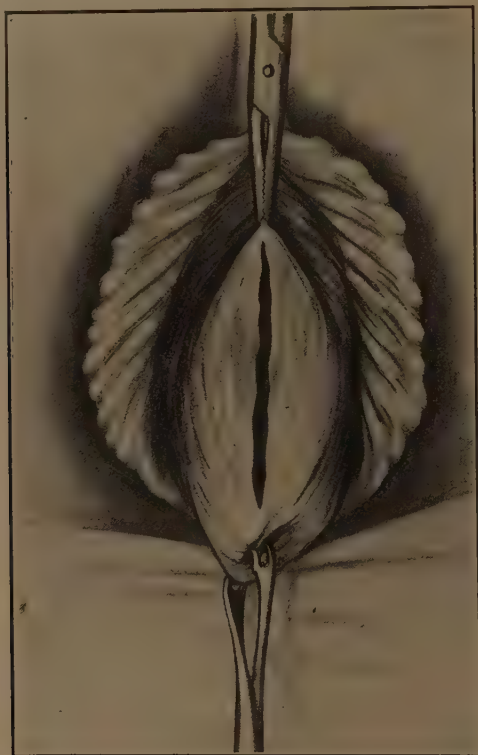


FIG. 49.—Anterior colporrhaphy. Method *B*. "A longitudinal incision is made from the level of the external urethral orifice to the cervico-vaginal junction."

If method *A* has been followed the edges of the cut vaginal wall are united longitudinally with interrupted silkworm gut or continuous chromic catgut sutures, preferably the latter. If method *B* has been adopted a continuous chromic catgut suture is introduced at one end of the wound through the apex of the triangle at one side, carried across to the apex of the

triangle on the opposite side and tied, after which it is continued in a similar manner to the other end of the wound, the needle picking up only the tissues at the lateral apex of the wound on each side. When this row of stitches is finished, it will be found

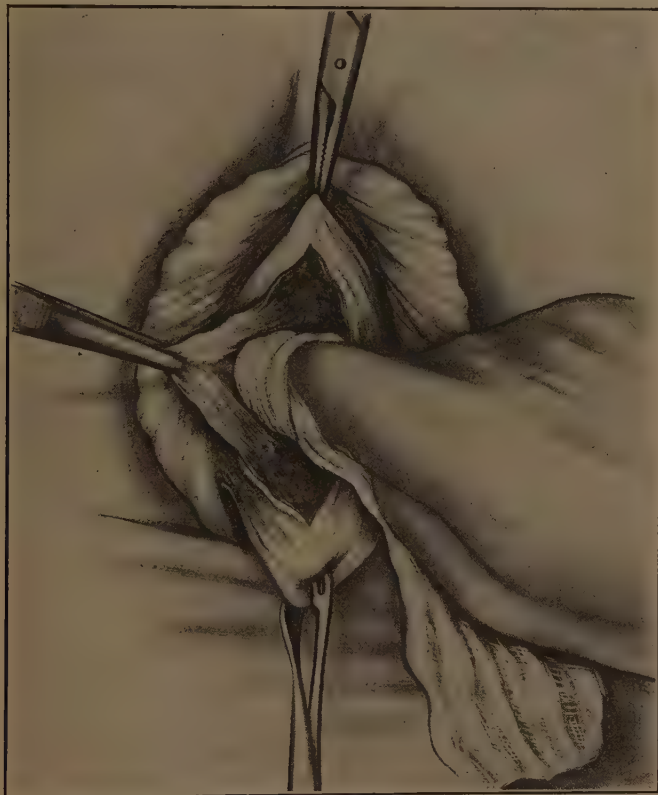


FIG. 50.—Anterior colporrhaphy. Method B. Separating anterior vagina wall from bladder.

that the vagina is firmly narrowed and the flaps before mentioned fall together by their broad raw surfaces instead of edge-wise. A little only of each flap is snipped off with the scissors, so that a distinct column is left down the middle of the anterior vaginal wall, and this is whipped over with another row of

catgut stitches. By this method much less tissue is removed than by method *A*, and that which remains assists in thickening the anterior vaginal wall.

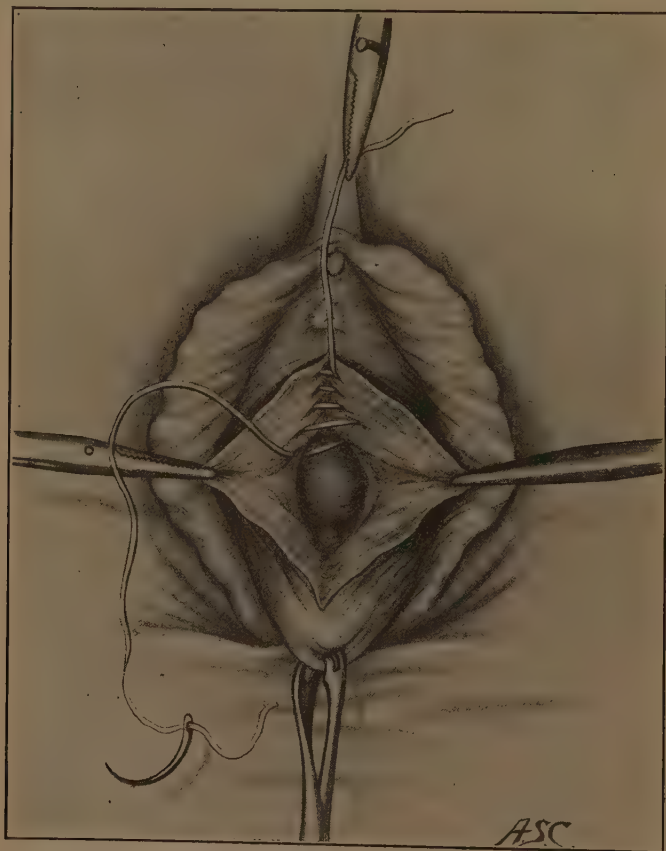


FIG. 51.—Method B. Suturing cut edges of vaginal wall. Deep plane of fascia first closed by continuous stitch.

In the event that retrodisplacement of the uterus is associated with the cystocele, additional denudation and suturing may be made by the plan proposed by Emmett. At the cervical end of the median incision two lateral areas of denudation are

made which partially surround the cervix. These areas are extended along the antero-lateral vaginal wall at the cervico-vaginal junction in such a manner that when sutured they pocket the cervix and tend to throw it back toward the hollow of the sacrum.



FIG. 52.—Anterior colporrhaphy. Method B. Sutures adjusting broad edges of flaps. Suturing is best done from behind forward contrary to illustration.

Hirst adds to the usual anterior colporrhaphy two small areas of denudation, one at either side of the urethra, which are of undoubted benefit. These are triangular in shape, the base of the triangle lying at the vulva while the apex is an inch higher

up in the antero-lateral vaginal sulci. These are so closed that the line of sutures runs antero-posteriorly.

Gersuny of Vienna adjusts a purse string suture in the



FIG. 53.—Anterior colporrhaphy. "Gersuny of Vienna adjusts a purse-string suture in posterior bladder wall."

posterior bladder wall before suturing the vagina, so that the base and posterior bladder wall are projected into the bladder in the form of a cone.

Incomplete Laceration, Perineorrhaphy.—The object to be obtained by secondary perineorrhaphy is such a restoration of the posterior segment of the pelvic floor as shall enable it to perform its physiological functions. Restoration to its original anatomical condition by means of a secondary operation is rarely possible, first, because the ends of the muscles have re-



FIG. 54.—Anterior colporrhaphy. Method B. Purse string tied. Suturing fascia in lateral depths of wound.

tracted, and second, because the muscles have undergone atrophy from disuse. This applies most forcibly of course to injuries in the lateral sulci. Secondary repair of small median injuries is of no surgical importance and is of cosmetic value only.

Three distinct types of operation are performed. (1st) That represented by the Hegar operation. (2nd) That represented

by the Emmett operation. (3rd) That represented by the Tait or flap-splitting operation.

The Hegar operation and its modifications depend for their efficiency upon a large area of denudation and the consequent narrowing of the vagina which is produced when this area is



FIG. 55.—Anterior colporrhaphy. Sagittal section after completion of anterior colporrhaphy with addition of Gersuny's purse-string suture.

sutured. No attempt is made to coapt the structures anatomically.

The operation is performed as follows: A hæmostat, bullet forceps, or suture is made to grasp the tissue at each side of

the vulvar orifice at the level of the uppermost caruncle, and a third catches the crest of the rectocele no matter how high in the vagina this may be. Traction laterally is then made on each instrument inserted at the outlet, while the one on the

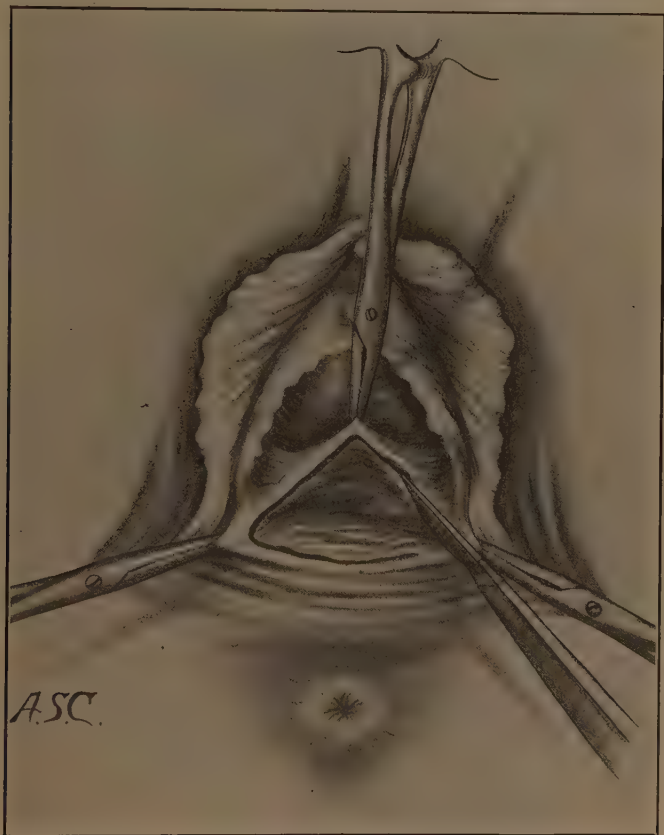


FIG. 56.—Hegar operation for repair of incomplete perineal laceration. Outline of area to be denuded.

rectocele is drawn anteriorly. A triangle is thus exposed which may be denuded in strips, or the sides of the triangle may be outlined with a knife and the entire flap dissected off. Sutures

are inserted from side to side beginning at the apex of denudation. When the raw vaginal surface is thus closed, external sutures can be made to coapt the skin perineum.



FIG. 57.—Hegar operation for incomplete perineal laceration. The denudation is completed. The vaginal sutures have been inserted from side to side.

The Emmett Operation.—In this operation a smaller area is denuded, but an attempt at anatomical repair is made by following the original lines of injury in the vaginal sulci.

This is done in the following manner: The crest of the rectocele together with the highest lateral points on the vaginal outlet, which are expected to meet in the new perineum, are

seized with forceps or suture as in the Hegar operation. The instrument on one side of the vulvar opening is drawn directly outward, while the one on the crest of the rectocele is drawn toward the outlet and to the opposite side. A triangle is thus

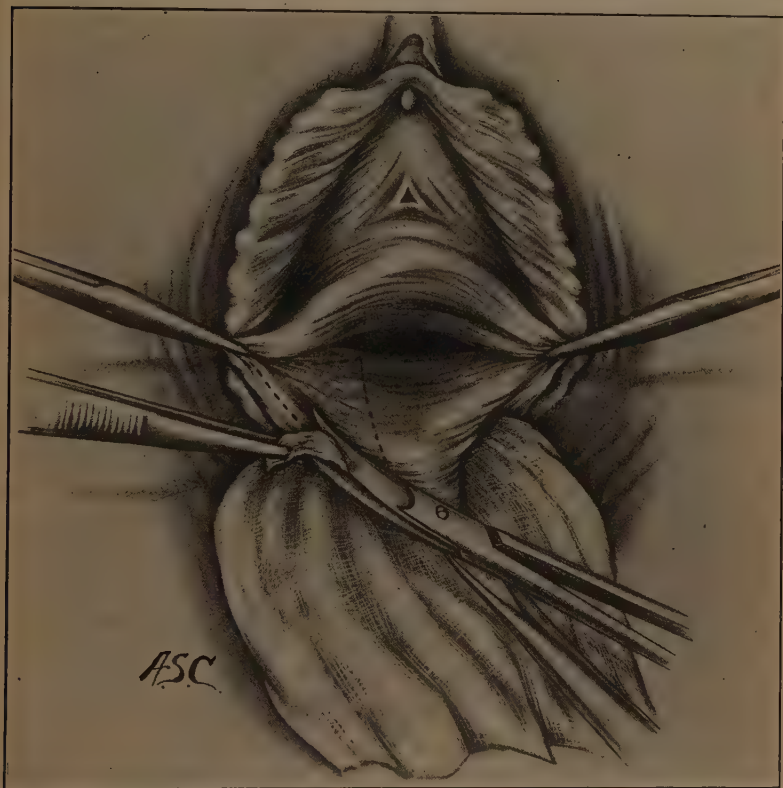


FIG. 58.—Emmett operation for incomplete perineal laceration. Dotted lines indicate area to be denuded in one sulcus.

formed having for its base a line running from one instrument to the other, while its apex is indicated by the upper end of the scar in the vaginal sulcus of that side. When the instruments are firmly drawn upon this triangle has an obtuse angle at its apex and is readily denuded with scissors. Exactly the same

procedure is repeated on the opposite side. Upon releasing the tension upon the instrument in the vagina and drawing each of those upon the vulva laterally, a third triangle of undenuded vagina is visible whose apex is at the level of the vaginal instrument, and whose base line extends transversely across the



FIG. 59.—Emmett operation for incomplete perineal laceration. Both sulci and third triangle, whose base is at mucocutaneous junction, have been denuded. Sulci sutures pass obliquely "so that the bottom of the stitch is nearer the vulva than the point of insertion."

vulva from one instrument to the other along the junction of the vaginal mucosa and perineal skin. This triangle is now denuded, when the area of denudation will appear as in Fig. 59, a triangle of undenuded vaginal mucosa, apex downward, appearing superiorly between the denuded sulci.

In suturing, the lateral sulci are closed first, the particular

part of the Emmett operation most often overlooked being the direction which is taken by the needle. This is *not* inserted at right angles to the posterior vaginal wall, but obliquely, so that the bottom of the stitch is nearer the vulva than the point of insertion, the effect of this being to draw the tissue between the vagina and rectum higher into the vagina. The stitches



FIG. 60.—Emmett operation for incomplete perineal laceration. The sulci are closed, excepting the lower stitch on each side. Crown stitch laid but not tied.

should also be buried in the tissue throughout their course, as otherwise the mucosa only will be coapted and this stretches out in time and allows a reproduction of the old relaxation. Suturing of the sulci is continued until the visible portion of denuded surface resembles a triangle whose apex meets the point of undenuded mucosa mentioned above as the crest of the

rectocele, the base of the triangle being the line of junction of perineal skin and denuded vaginal wall.

After closure of the sulci the so-called crown stitch is introduced with a large well-curved needle which enters at the point occupied by the forceps at one side of the vulva, passes

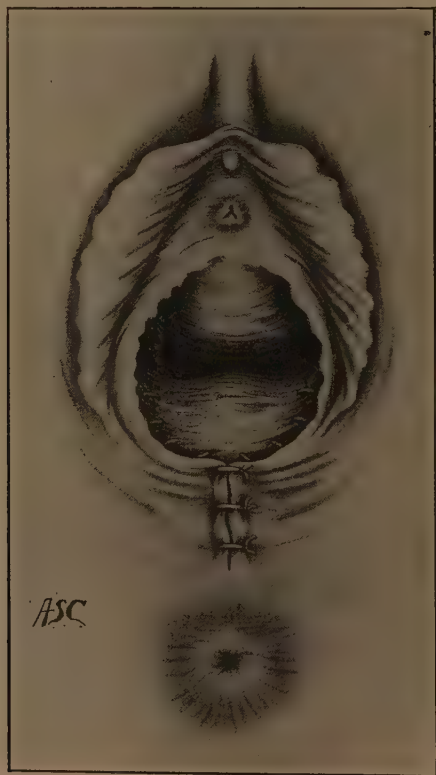


FIG. 61.—Emmett operation for incomplete perineal laceration. The operation is complete.

transversely across buried just beneath the vaginal mucosa, runs through the tip of the tongue of tissue in the middle of the posterior vaginal wall, and emerges on the opposite side at the point occupied by the forceps on that side. This suture should

also be buried throughout its entire length, and when tied it approximates the points formerly occupied by the three forceps and reveals the extent of skin perineum remaining to be sutured. The skin sutures are then introduced from side to side and the operation is completed.

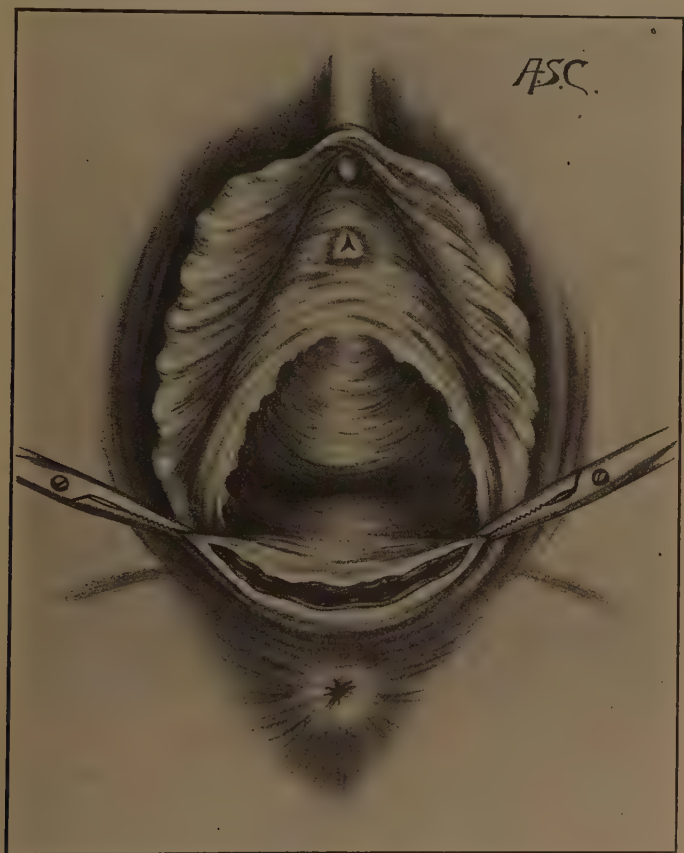


FIG. 62.—Secondary repair of incomplete perineal laceration by split-flap method. The posterior commissure is split transversely.

Split-flap Perineorrhaphy.—As originally practised by Tait this operation had little more than a cosmetic effect, but on its principle is based an operation which combines the advantages

of the Hegar in narrowing the vagina, the Emmett in elevating the anus, and has merits of its own in securely joining the levators of either side between the vagina and rectum.

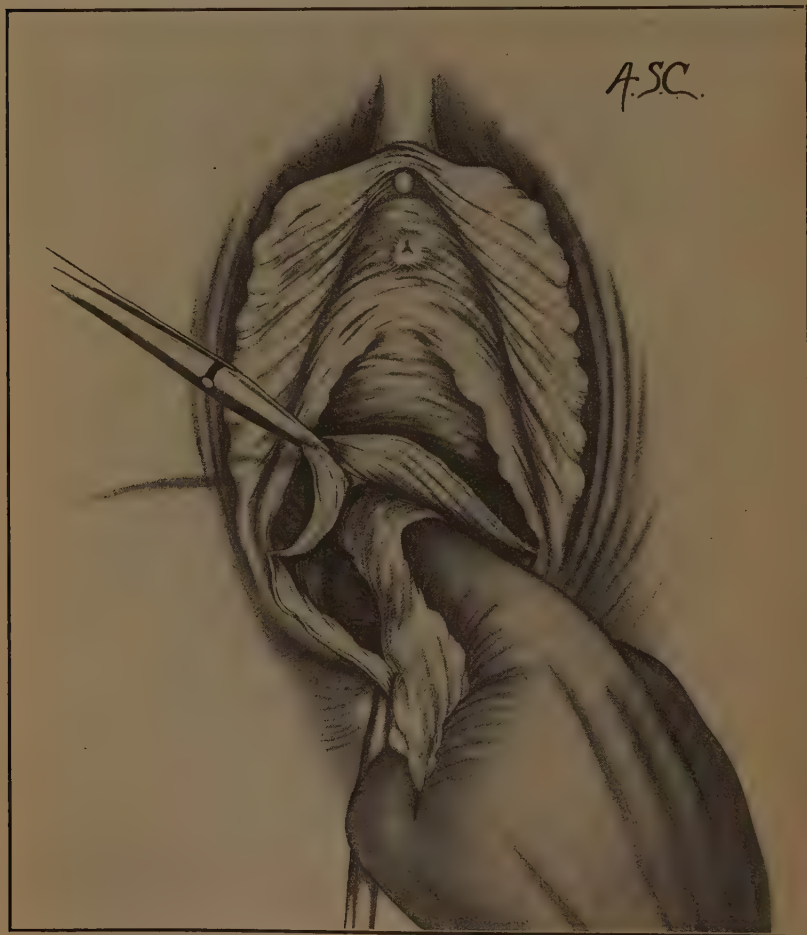


FIG. 63.—Secondary repair of incomplete perineal laceration by split-flap method. "The vaginal flap is raised and dissected from the rectum by the finger covered with gauze."

Tait's original operation consisted in separating the posterior vaginal wall from the skin of the perineum by a transverse

incision made with scissors, elevating the vaginal flap, deepening the incision to the extent of 3 or 4 cm., and uniting the wound by sutures placed transversely. The flap thus elevated was not removed. The result was merely to unite the split perineal body whose muscles are relatively unimportant, leaving the

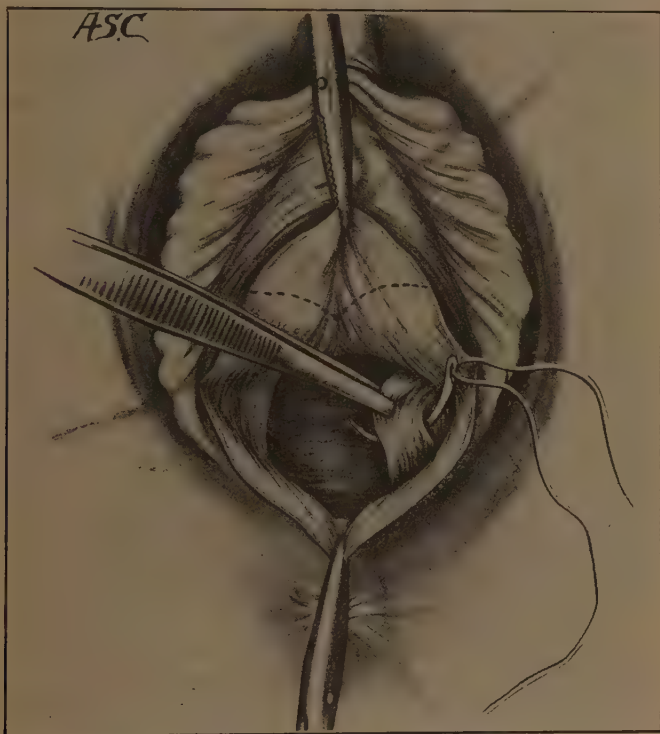


FIG. 64.—Secondary repair of incomplete perineal laceration by split-flap method. Suture catching edge of levator. Dotted line for removal of superfluous flap.

true supporting structures of the pelvic floor as they were before operation.

If, however, the deep dissection is carried sufficiently high between the rectum and vagina, a flap is raised which if removed would give practically a Hegar denudation, and if the

dissection is carried widely enough toward the lateral vaginal walls it permits of the adjustment of the levator muscle and fascia *behind* the vagina.

After placing forceps on either side of the vulva as in the preceding operation, the posterior commissure is split trans-

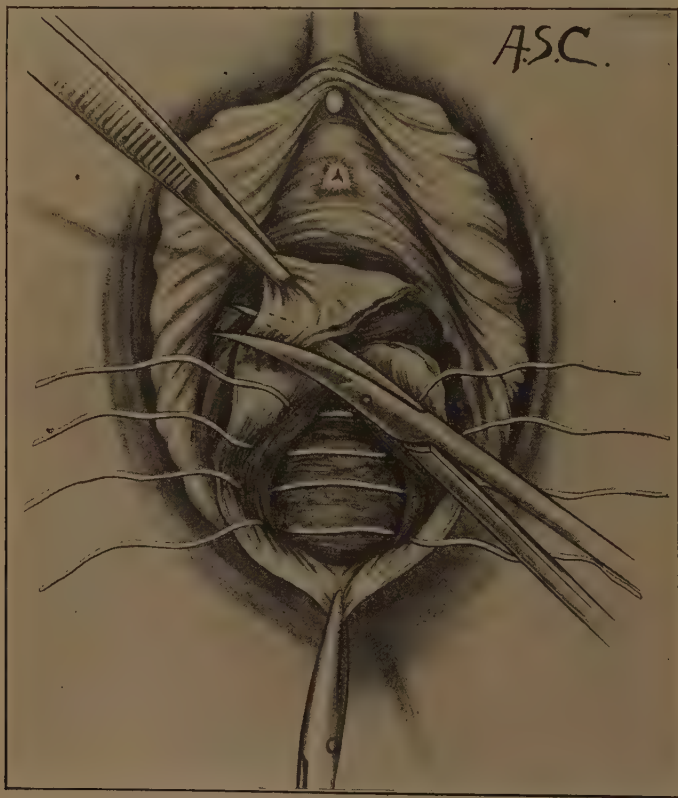


FIG. 65.—Secondary repair of incomplete perineal laceration by split-flap method. Sutures in levators not tied. Flap in process of removal.

versely from one forceps to the other, and the vaginal flap is raised and dissected from the rectum by the finger covered with gauze. At both sides some cicatricial tissue may need to be cut with scissors but the dissection as a whole is made bluntly.

This separation may be continued as high as is deemed necessary, even to the peritoneum, and should extend sufficiently far laterally to expose the levators to view. There is no danger of perforating the rectum and no necessity for soiling the fingers



FIG. 66.—Secondary repair of incomplete perineal laceration by split-flap method. The edges of the flap have been approximated after tying deep sutures. The skin sutures are also tied. Operation completed.

by their introduction into the anus. An occasional large vein which is torn across needs tying.

The sutures of small sized chromic catgut are started at the apex of the denudation and approximate the lateral vaginal walls

posterior to the flap and superior to the levator muscles. The sutures may be either continuous or interrupted, preferably a combination of both in order to avoid the annoyance of a broken strand when the suture is nearing completion, so necessitating re-suture of the entire wound if the continuous stitch is used without interruption.

When the levators are reached, as they are after one or two stitches are in place, great care is used to approximate them broadly, and an occasional stitch across the under surface of the flap serves to obliterate dead space and produce a column on the posterior vaginal wall. When the sewing has reached a point near the skin, catgut is discontinued and silkworm gut used on the external surface. Before closing the skin the small portion of superfluous flap which is found projecting above the closed wound is trimmed off, and the edges united to each other and to the external skin. Some operators allow the superfluous portion of flap to remain, but this leaves a tag of tissue which projects from the vagina after healing is complete. While this is of no practical importance the work looks unfinished and it sometimes alarms the patient when it is discovered.

Complete Laceration.—Secondary repair of complete laceration is becoming less frequent since such injuries now are rarely overlooked at the time of their occurrence, and primary repair is generally successful. The few cases in which repair has not been attempted or in which union has failed are left in a very annoying condition because of incontinence of gas and liquid feces. When the injury extends barely through the sphincter, enough scar tissue may form across the anterior wall of the anus to give partial control, but spontaneous union of the anterior ends of the sphincter is rendered impossible by reason of their wide retraction.

Owing to the previously mentioned fact that complete tears are central and do not involve the levator muscles or fascia, the anus is held well forward and no prolapse of the viscera is present.

Examination at once reveals the condition. The edge of the

recto-vaginal septum is thin and the rectal mucosa is visible posteriorly. At either side of the anus, but on a line with its posterior margin, a small pit or dimple reveals the location of the sphincter ends.

Simple Operation.—The principal object to be sought in the repair of complete laceration is the restoration of the integrity of the rectum and anal sphincter, and the simplest method of attaining this object is to denude the area covered by cicatricial tissue—taking pains to make the denudation as broad as possible at its apex—to suture the rectal mucosa from the rectal side, being especially careful of the first stitch at the apex, and to insert one or two tension sutures behind the sphincter ends. The injury is thus converted into an incomplete laceration which is repaired by suturing the vaginal mucosa from the vaginal surface and completing the operation by stitching the skin perineum.

Owing to the difficulty of accurately placing the sutures, through leakage along the rectal wall, and the mechanical result of bowel movements, union unfortunately fails here more often than in incomplete injuries, and methods of repair which remove no tissue are preferable to the one outlined. These methods are all based on the flap-splitting principle and are sufficiently represented by the following, which is entirely satisfactory.

SPLIT-FLAP OPERATION

With a sharp knife the margin of the recto-vaginal septum is first split transversely to a depth of at least 1 cm. This provides a vaginal flap and a rectal flap at the apex of the tear. Each end of this incision is then prolonged through the scar tissue along the lateral vaginal wall on either side of the cloaca and at least $\frac{1}{2}$ cm. from the rectal mucosa, the incision terminating at the skin on either side. The first incision is thus completed as an inverted U, the convex end of which is situated in

the recto-vaginal septum above, the legs of the U extending through the scar at either side to the skin.

From each end of this incision, that is at the junction of vaginal mucosa and skin and at right angles to it, a short antero-posterior cut is made. The anterior end of this last incision is



FIG. 67.—Secondary repair of complete laceration of perineum.
Line of incisions.

on a level with the remnant of the lower hymeneal caruncle. The posterior end extends just through the dimple representing the retracted end of the sphincter ani.

Reference to the figure will show that two flaps are now out-

lined upon either side. By dissecting up each anterior flap to the extent to which it is covered by cicatrix, tissue for the new posterior vaginal wall is furnished. By dissecting and turning backward the posterior flaps to the extent to which they are



FIG. 68.—Secondary repair of complete perineal laceration. Flaps have been raised anteriorly and posteriorly by blunt dissection with finger.

covered by cicatrix, sufficient raw surface is exposed to hold the sutures which are to approximate the anterior rectal wall, and the retracted sphincter ends are uncovered. Exposure of these sphincter ends must be complete.

Suturing may now begin. For the rectal stitches fine silk or

celloidin thread is preferable. The first stitch is taken at the very apex of the tear, the needle penetrating the rectal mucosa only. This stitch is at once tied with the knot on the rectal side, and then continued to the anal skin as a continuous close



FIG. 69.—Secondary repair of complete perineal laceration. Continuous rectal suture in position but not drawn up. Deep retention suture laid through sphincter ends.

set suture. It is not always feasible to finish and tighten the lowermost end of this suture until a retention suture for the sphincter is placed. This should be of rather coarse silkworm gut and is introduced *behind*, not through, the ends of the sphinc-

ter and passes high up toward the apex of the wound as described on page 131. When drawn upon this suture approximates the ends of the sphincter, and the continuous rectal suture is tied while the retention suture is held. The latter is then tied and cut and the ends at once retract inside the anus. If

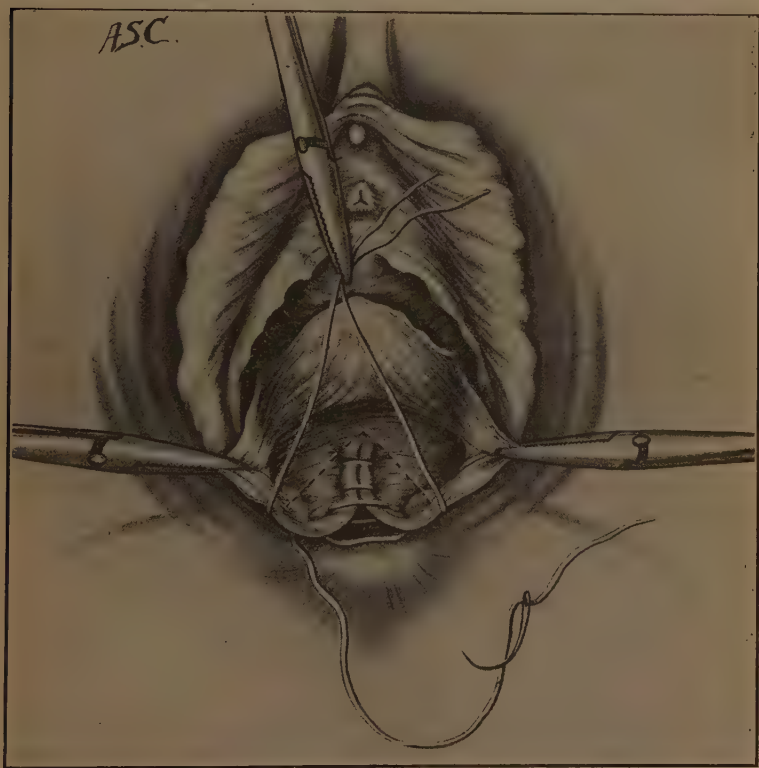


FIG. 70.—Secondary repair of complete perineal laceration. Rectal suture drawn up.

deemed necessary one or two fine buried catgut stitches may be applied in order more closely to unite the sphincter ends.

The tear now has been converted into the incomplete form and the final repair is made by suturing the vaginal side of the recto-vaginal septum and the skin surface.

General Remarks.—Though operations upon the female perineum are performed in an area which is never completely or even adequately sterilizable, they are almost uniformly successful if properly performed. Preliminary asepsis nevertheless should be as perfect as possible. Large preliminary douches, made soapy with green soap, creolin or lysol should be

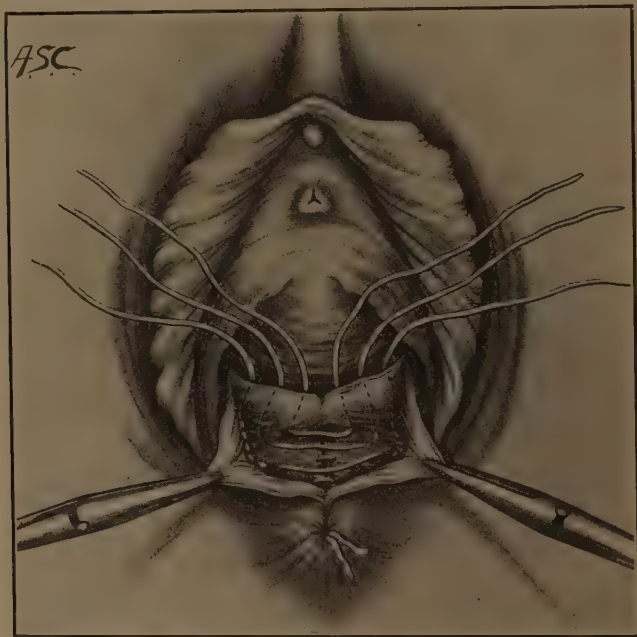


FIG. 71.—Secondary repair of complete perineal laceration. Rectal mucosa approximated. Knot of retention suture has disappeared within anus. Tear is now incomplete. Sutures in vaginal flap for restoration of posterior vaginal wall.

used for a day or two preceding operation, not so much for their antiseptic effect as their mechanical cleansing qualities. The lower bowel should always be empty, else the operative area will certainly be soiled by fecal matter during the operation. This condition should be secured by a laxative 24 hours before operation, an enema immediately after the laxative has acted,

and another four or five hours before the operation. The external parts should be prepared after the patient is anesthetized in order that it may be done thoroughly. In the repair of incomplete laceration the finger should not be introduced into the rectum.

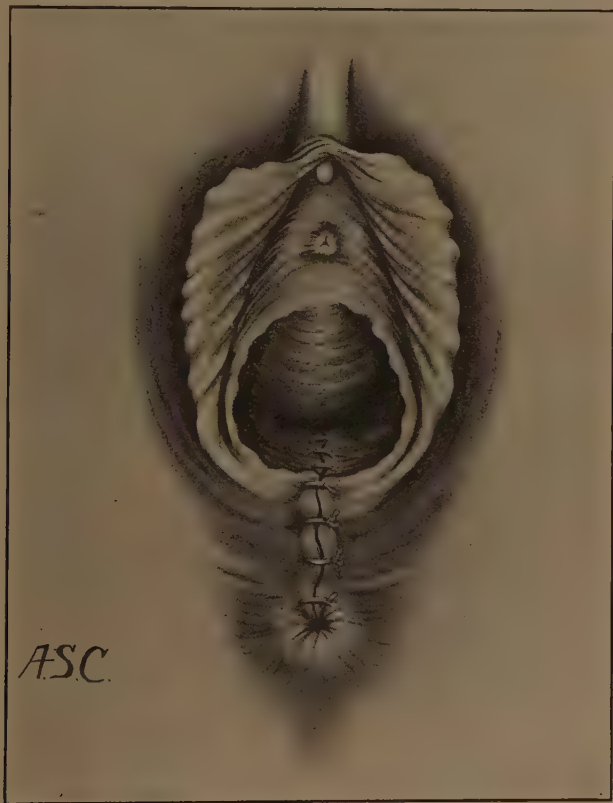


FIG. 72.—Secondary repair of complete perineal laceration. Posterior vaginal wall restored. Skin sutures tied. Repair is complete.

The utmost neatness should be observed in the repair of complete injuries, and all gloves, instruments, etc., changed after the rectum is closed.

Even with the greatest care some contamination is inevitable

and one is forced to the conclusion that this portion of the body is at least partially protected, and that its resistance toward its own type of infection is increased by the constant soiling to which it is subjected throughout life.

While the suturing should be accurate throughout and the tissue approximated, the stitches should not be tight, else they will cut and sink into the parts so deeply that their removal is difficult.

After-care.—An iodoform gauze strip is lightly packed into the vagina at the close of the operation to act as a capillary drain for the first two days, at the expiration of which time it may be removed. Douches are not used unless the discharge is free, and they are best avoided for a week at least, since the mechanical disturbance of the parts more than offsets the problematical good which they do. No attempt is made to keep the perineum dry as the mechanical disturbance of wiping does more harm than good, and in any event dryness cannot be secured. The catheter is not used unless absolutely necessary as fresh urine is sterile, but the external parts are douched with sterile water after each urination and defecation.

The care of the bowels after repair of an incomplete tear is that after any operative procedure, but after the repair of complete injury much thought must be given to their condition. One is confronted by the necessity for avoiding hard scybalæ or large bowel passages on the one hand, and the desirability of keeping the wound clean on the other. For reasons given above, mechanical injury seems more fatal to healing than does soiling, and it has become the author's routine practice to limit the diet to liquids, excluding milk, for two days, and then to open the bowels by means of small repeated doses of one of the saline laxatives. So soon as the bowels show an inclination to move an oil enema is given through a soft rubber catheter, and the external wound is thoroughly douched after the evacuation is complete. After the first motion the severe dietary restriction is somewhat relaxed, but bulky food and milk are avoided and a

soft bowel motion secured every second day. The stitches are removed from the external surface in from 9 to 12 days, the catgut vaginal sutures do not need removal, and the celloidin or silk rectal suture comes away spontaneously. The patient may be up at the expiration of 12 or 14 days after operation for complete laceration, but the recumbent posture is desirable for a few days longer in cases in which there has been a marked cystocele, rectocele, or uterine prolapse.

The legs are not bound together unless the patient is very excitable as no ordinary motion of the extremities puts any strain upon the suture line.

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CHAPTER VI

DISEASES AND INJURIES OF THE VAGINA

Vaginitis.—Clinically, vaginitis is divided into the acute and chronic forms according to the symptoms presented and the duration of the disease. Here, as elsewhere on epithelial surfaces, a strict differentiation between acute and chronic inflammation on pathological grounds cannot be made, as true chronic inflammation characterized by the formation of new connective tissue is rarely found.

Acute vaginitis may be caused by traumatism, by chemical damage, and by infection. Injury eventuating in inflammation may be produced by violent or frequent coitus and by foreign bodies such as ill-fitting pessaries. Inflammation caused by chemical agents is exemplified by the vaginitis which follows the use of strong bichloride of mercury douches for the prevention of conception, imperfect solutions of carbolic acid used for cleansing purposes in which the pure acid comes into contact with the vaginal mucosa, and douches of powerful astringents. In adults, vaginitis of gonorrheal origin as well as that associated with cancer of the uterus is probably due to chemical irritation of the discharge rather than direct microbic action.

Acute vaginitis due to infection is produced by divers pathogenic micro-organisms.

Streptococci, staphylococci, colon bacilli, and diphtheria bacilli may invade the vagina and set up inflammatory action. While the first three mentioned are many times present in the vagina without invading the tissues, they are the common source of infectious vaginitis following the injuries produced by child birth.

As stated above, gonorrheal vaginitis is more likely due to the chemical irritation of pus from an infected cervix than to

the direct invasion of the vaginal mucosa by gonococci, but in infants and very young children the character of the vaginal covering more nearly resembles that of a true mucous membrane and a gonococcus infection of the vagina may occur.

Some cases of vaginitis appear to be due to trophic disturbances only. Thus we have the papillary vaginitis of pregnancy without actual bacterial invasion, and senile vaginitis sometimes seems to be entirely trophic in its nature.

Symptoms.—The local symptoms of acute vaginitis are burning, throbbing, and pain. In severe infections the general symptoms are marked, but in ordinary instances of acute vaginitis there is no elevation of temperature or increase in the pulse rate.

The physical signs are redness and increased local temperature, followed in a short time by a marked increase in the vaginal secretion. Areas which are partially denuded of epithelium bleed readily, and thus the secretions may be blood stained. In the papillary vaginitis of pregnancy the vagina is studded with minute, reddish looking, granular elevations. In senile vaginitis the mucosa appears atrophic but with red patches which are smooth and bleed readily. In puerperal vaginitis membranous deposits are not uncommon.

Treatment.—In very acute cases, whether puerperal or otherwise, the patient should remain in bed.

In puerperal vaginitis douches should not be given because of the risk of infecting the uterus. Ulcerated areas should be touched with pure carbolic to be neutralized immediately by alcohol, or a very strong solution (10–20 per cent.) of nitrate of silver may be applied to the ulcer.

Abundant drainage may be secured by a loose packing of iodoform gauze in the vagina. If the infecting agent is the Klebs-Loeffler bacillus, diphtheria antitoxin must be given, but membrane on the vaginal wall may be due to streptococcic infection instead of true diphtheria.

Ordinary acute vaginitis is readily controlled by the use

of abundant warm normal salt or boric acid douches in the early stages, followed by astringent injections as the acute symptoms subside and the discharge becomes free. After the primary irritation has subsided, the vagina should be thoroughly

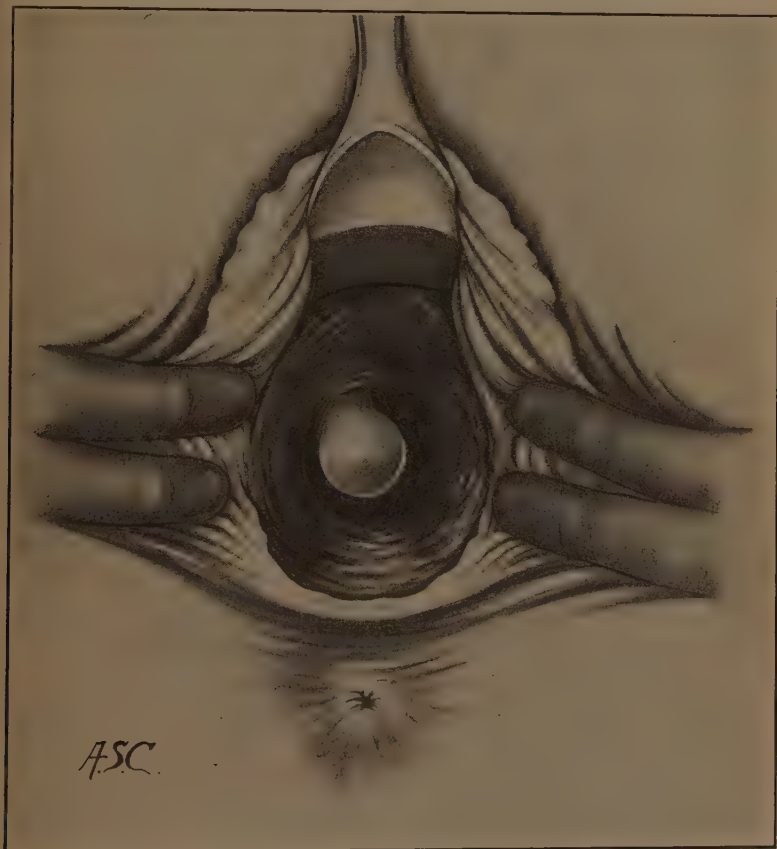


FIG. 73.—Vaginal cyst.

mopped out once a week with a moderately strong solution of silver nitrate, or the silver solution may be poured in through a cylindrical speculum. Should this give rise to pain it may be neutralized at once with salt solution. Some of the milder

silver salts, such as Argyrol and Protargol, may be used from the outset without causing irritation, but nothing equals the nitrate in efficiency after the early pain and swelling have disappeared.

The vaginitis of pregnancy may be treated in the same manner, but solutions should always be weaker than those used in the non-pregnant, and the risk of inducing abortion by prolonged hot douches must be borne in mind.

In the gonorrheal vaginitis of infants the vagina should be irrigated frequently, using a small soft rubber catheter in order to avoid injury to the hymen, and weekly or semi-weekly installations of silver solution are to be applied by the physician with a small medicine dropper.

Senile vaginitis is intractable to treatment. Here the milder alkaline douches such as biborate or bicarbonate of sodium are serviceable, but a permanent cure is rarely effected.

Tumors.—New growths of the vagina are relatively uncommon.

Carcinoma of the vault is occasionally found and should be extirpated if complete, far-reaching removal is possible. It is not often that a sufficiently wide removal can be practised to make operation justifiable, and incomplete removal or curettage is more likely to cause wide dissemination than to effect a cure. While a well-developed cancer of the vaginal vault is almost hopeless, the X-ray and radium, or the actual cautery as advised for cancer of the cervix, should always be tried.

Vaginal cysts are occasionally seen and may reach a large size. They are presumed to have their origin in unobliterated portions of Gaertner's duct and may extend deeply into the para-vaginal structures at the lateral vaginal fornices. Extirpation may be difficult and bloody, and if it becomes apparent that complete removal is too formidable the cyst should be incised, as much of its wall removed as possible, and the cavity forced to heal from the bottom by constant gauze packing.

Injuries.—Injuries to the vagina may be produced by violence or the introduction of foreign bodies, and are to be treated on

general surgical principles by suture, drainage when indicated, etc.

Puerperal injuries due to laceration or cutting with forceps blades need no special comment as they are repaired in connection with repair of the injuries to the vaginal outlet with which they are associated.

VESICO-VAGINAL AND RECTO-VAGINAL FISTULÆ

Puerperal injuries due to sloughing, however, are of quite another type, and it was in an effort to cure these that J. Marion Sims laid the foundation of modern gynæcology.

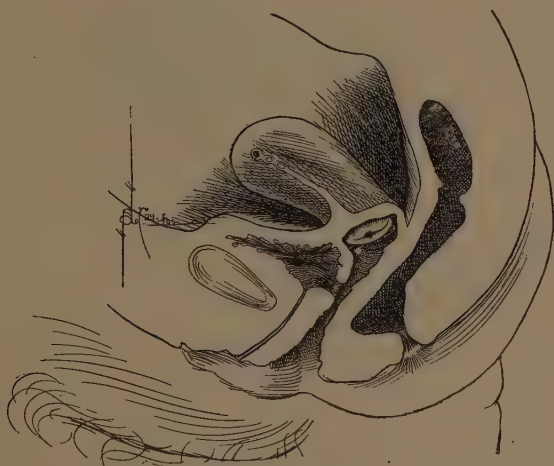


FIG. 74.—Remote result of sloughing of recto-vaginal septum. Recto-vaginal fistula.

Lacerations through the vaginal wall extending into the bladder usually heal even if unrepaired, and similar injuries extending into the rectum sometimes follow the same course, but sloughing and *loss of tissue* render healing impossible in the event that either bladder or rectum are involved. It follows, therefore, that vesico-vaginal and recto-vaginal fistulæ occur—

ring *at the time of labor* may heal without intervention, but such fistulæ are likely to remain permanent if they have their inception several days later, when they are due to necrosis and sloughing.

The etiology of both vesico-vaginal and recto-vaginal fistulæ is the same; sloughing brought about by pressure necrosis due to great prolongation of the second stage of labor. While this was a common accident when the obstetric forceps was used only as a last resort, it is rarely seen at the present time when



FIG. 75.—Remote result of sloughing of vesico-vaginal septum. Vesico-vaginal fistula.

the same instrument is too frequently used without the slightest justification.

Symptoms.—The symptoms are plain; escape of urine through the vagina in vesico-vaginal fistulæ, and escape of gas or feces or both, in recto-vaginal fistulæ. On examination the lesion is readily discovered if the loss of tissue has been large, but in small leaks the injection of colored fluid into the involved viscus may be necessary before the opening can be found.

Vaginitis is set up by the irritation of the excretions passing through the vagina, and in vesical fistula the deposition of

urinary salts upon the vagina and vulva is usual. Recto-vaginal fistulæ, as a rule, are moderate in size because the posterior vaginal and anterior rectal walls do not suffer so severely from prolonged pressure as do the anterior vaginal and vesical walls.

Vesico-vaginal fistulæ are sometimes very extensive, involving the entire vesico-vaginal septum and extending into one or both ureters, and occasionally the anterior uterine wall is also destroyed converting the bladder, uterine cavity, and vagina into one large cloaca.

Treatment.—Very small openings into either bladder or rectum frequently heal through the cicatricial contraction following the cautious and gentle application of the thermo-cautery. In all other instances the treatment is operative.

Operations for Vesico-vaginal Fistula.—Before operating, the vaginitis which is present should be relieved by mechanical removal of the deposit of urinary salts, followed by douches and astringent applications. The re-accumulation of these deposits can be prevented to some extent by the administration of ammonium or sodium benzoate in 10–15-grain doses three or four times daily. These compounds of benzoic acid tend to render the urine acid and thus prevent precipitation of the triple phosphates of which the concretions are composed.

In the very small fistulæ the operation is simple and consists in denudation of the edges of the opening and their approximation by suture in the direction of least resistance. The opening can usually be exposed by firm retraction of the perineum while the patient is in the lithotomy position, but the latero-prone or Sims's position may be required. The denudation should be made in such a manner that its broad face is upon the vaginal wall, and sutures, if in one layer, should penetrate, to but not through, the bladder mucosa.

The sutures should be of silkworm gut or silver wire and should be just tight enough to approximate the tissues without tension. "*Tension is fatal to success in plastic surgery.*"

In the after-treatment the bladder is kept empty by the introduction of a permanent or retention catheter until healing is complete, as this is less likely to produce cystitis than repeated catheterization.

Large openings, or moderate-sized openings whose edges cannot readily be approximated, demand a more extensive operation, and separate suture of the bladder and vaginal walls.

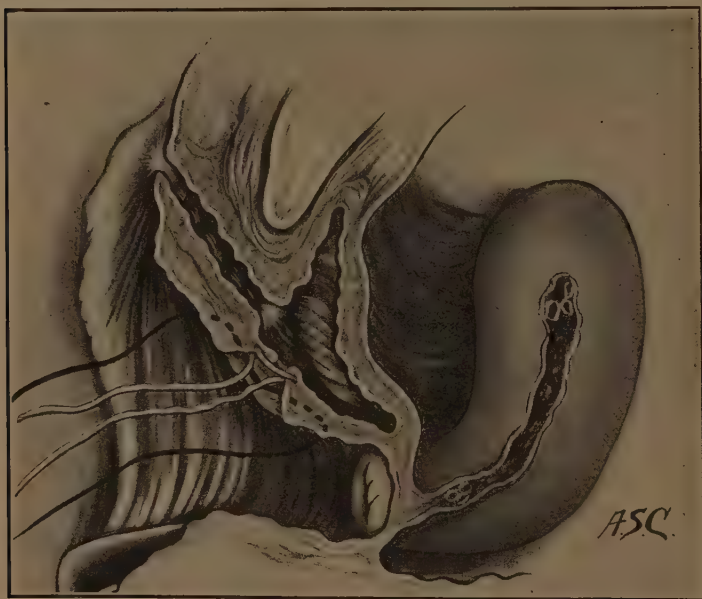


FIG. 76.—Sutures inserted for repair of vesico-vaginal fistula. Note: No sutures in bladder mucosa.

Placing the patient in that position, usually the Sims's, by which the fistula is most completely exposed, its margins are split, separating the bladder from the anterior vaginal wall. Once the line of cleavage is found, it is comparatively easy to carry this separation to the lateral vaginal walls if necessary in order that the bladder margins may come together easily. Buried sutures of fine chromic gut then unite the sides of the

opening into the bladder, these sutures taking in bladder wall only and being applied Lembert fashion, turning up a ridge into the interior of the organ. The vaginal wall is next repaired, using silkworm gut or silver wire, and if possible leaving a ridge in the vagina. In this manner the sutures approximate a far larger area of raw surface than is possible if the edges only are united, with a correspondingly greater chance that firm healing will occur.



FIG. 77.—Sagittal section after sutures are tied. Note: Bladder mucosa falling together without suture.

Complete destruction of the vesico-vaginal septum is extremely difficult to repair. The method most likely to succeed involves opening the bladder through a supra-pubic incision, freshening the edge of the fistula, and suture of the base of the bladder as after the removal of a tumor, care being taken to avoid constriction of the ureters. The ingenuity of the surgeon will be taxed to the utmost in these cases in order that a sufficient amount of tissue may be secured for denudation and repair,

and it may be necessary to utilize the anterior wall of the supra-vaginal portion of the cervix for this purpose.

The preparatory and after-treatment are the same as for smaller fistulæ, even more attention being given to securing healthy bladder and vaginal walls previous to operation, and to preventing distension of the bladder afterward.

Operation for Recto-vaginal Fistulæ.—Owing to the laxness of the tissue in the recto-vaginal septum above the perineum, these fistulæ are more readily closed than those just discussed. The smaller ones are handled precisely like small vesico-vaginal fistulæ, viz., by denudation and approximation of a broad area on the vaginal side of the orifice.

Larger openings should have the rectal and vaginal walls sutured separately. This may be done by splitting the edge of the fistula, or if the opening is not too high in the vagina, by separation of the rectum and vagina as in the flap-splitting operation for perineal laceration, and suture of the opening in the rectal wall through the space thus gained. Denudation and suture of the margins of the opening in the vaginal wall is then made from the vaginal surface.

A characteristic small fistula sometimes persists after the repair of complete perineal laceration. These fistulæ usually open into the rectum just above the internal anal sphincter, and their vaginal orifice may be at any point above the anterior edge of the perineum. They sometimes heal under the use of the actual cautery but frequently demand a less extensive repetition of the original operation with complete excision of the fistulous tract.

The sphincter ani should be paralyzed by thorough dilatation before the operation proper is begun in order that gas and liquid feces may escape through the anus instead of bringing pressure to bear upon the suture line, and the care of the bowels should be the same as after the repair of complete laceration of the perineum.

In some recto-vaginal fistulæ the simplest method of procedure

is to incise the entire recto-vaginal septum from the fistulous tract to and through the perineal body and sphincter ani, thus making a complete laceration of the perineum. The edges of the fistula are then freshened, preferably by splitting the vaginal from the rectal wall, and the sutures are applied as in the operation for complete perineal laceration.

Atresia of the Vagina.—See Chap. XV.

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CHAPTER VII

DISEASES AND INJURIES OF THE CERVIX

Erosion.—The normal covering of that portion of the cervix which projects into the vagina, the “portio-vaginalis,” is stratified squamous epithelium and its color varies from the gray

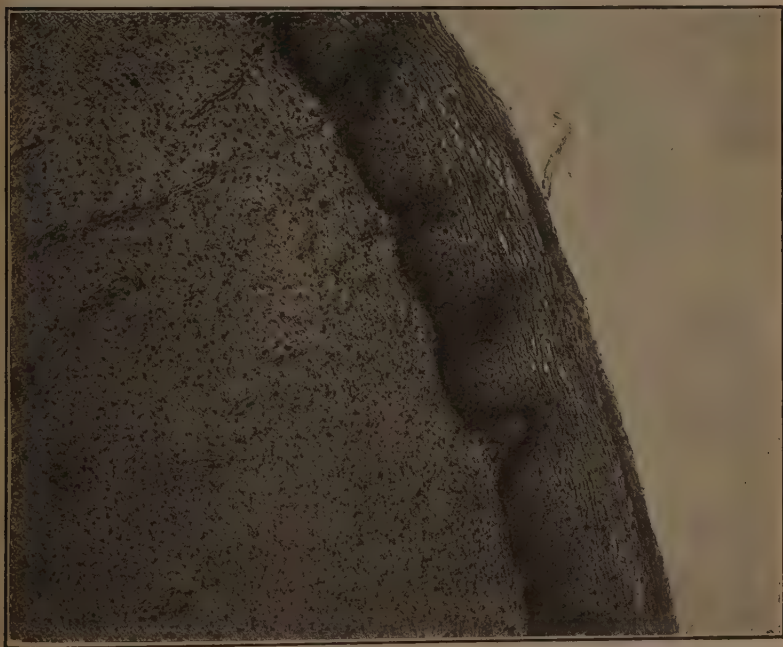


FIG. 78.—Normal cervical epithelium. Because the material is cut to a very slight extent at an oblique angle the number of layers of cells appears to be somewhat increased, but not to a marked degree.

pink of the vaginal mucosa to a grayish purple. The color of the mucosa within the cervical canal is a deep red.

Under the influence of infection of the mucosa of the cervical

canal, or the constant irritation associated with everted cervical lips following cervical laceration and low-grade infection, the squamous epithelium about the vaginal portion of the cervix is replaced by columnar epithelium, and the color of the involved part of the portio-vaginalis becomes the same as that of the cervical canal. This condition is known as erosion and is popu-

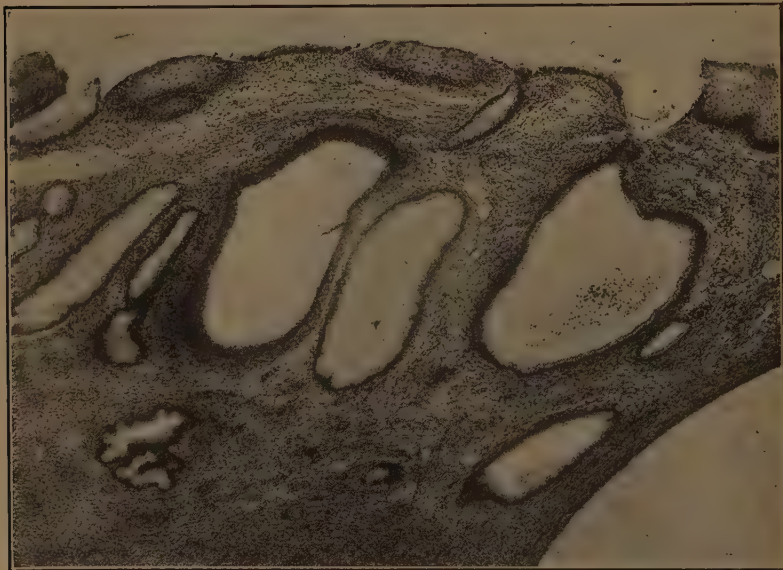


FIG. 79.—This section shows a typical area of glandular erosion with beginning healing. There are three areas shown in which the surface is covered with a simple columnar epithelium instead of a stratified squamous. Between these are islands of fairly normal epithelium. These are growing over and under the glandular elements in an attempt to produce healing. At the extreme left the squamous epithelium is undermining the gland and apparently trying to enucleate it. This is another method of healing.

larly but incorrectly termed ulceration. The only symptom produced is a muco-purulent leucorrheal discharge which may be blood streaked after coitus. Upon digital examination the surface about the external os has a soft, slippery, velvety feel and frequently it bleeds as a result of examination. In consequence of agglutination of the mouths of the glands which open

upon the surface of the cervix, retention of secretion occurs producing Nabothian follicles which feel like hard, round elevations. They are rare in nulliparous cervixes, but quite common in women who have borne children. Erosion is recognized and its extent appreciated upon inspection. It should not be mistaken for eversion of the cervical mucosa, for true ulceration, or, most important of all, for cancer.

Apparent erosion, due to hyperplasia and rolling out of the mucosa within the cervical canal, is distinguished by its appearance. True ulceration always exhibits loss of substance, while erosion does not. Moderately advanced carcinoma breaks down readily under the finger and there is actual new growth. Advanced cancer presents both new growth and excavation. Early cancer gives no pathognomonic evidence of its presence without microscopic examination, wherefore, *during the cancer age an erosion which fails to heal under a few local applications is an indication for the removal for microscopic examination of a small section of that portion of the cervix which underlies the erosion.*

Nabothian follicles are diagnosed by puncture and evacuation of the retained secretion which consists of a whitish viscid mucus.

Treatment.—Eroded, lacerated cervixes in women beyond the child-bearing age should be amputated. Erosion of the uninjured cervix should be treated by attention to the infected mucosa of the cervical canal as well as the erosion itself.

Non-malignant erosion will heal, temporarily at least, after a few applications of strong nitrate of silver solution (10–20 per cent.) or very light application of the solid stick together with the daily use of astringent douches, of which tannic acid in $\frac{1}{2}$ to 1 per cent. solution is the best.

Unless the original exciting cause is done away with, whether it be laceration or cervical infection, the erosion is certain to recur.

Endocervicitis and Cervical Polypi.—The normal cervical discharge is a thick, glairy, slightly opaque mucus which is secreted in small amounts. Hypersecretion of a similar mucus may be brought about by congestion and in some instances by unknown causes.

Inflammation, however, is due to infection which not only causes an increase in the quantity of normal mucus, but an admixture of pus as well.



FIG. 80.—Cervical polyp. An obstructed oedematous gland projects from the cervix as a polypus.

In chronic endocervicitis the cervical mucosa undergoes hyperplasia and may roll out of the external uterine orifice, or if a gland becomes obstructed and the retained secretion renders it oedematous, it projects from the external cervical orifice as a distinct polypus.

The chief sources of infection are gonorrhea, infection during

labor, and infection during the puerperium of unhealed injuries occurring at the time of labor.

Acute infection of the cervix is prone to extend to the endometrium of the uterine body by continuity of tissue, or to the ovaries through the lymphatics at the base of the broad ligament.

Chronic infection seldom extends to the body of the uterus and infections which primarily were acute, but have subsided, are almost always confined to the cervix. "*Chronic purulent endometritis*" really is *chronic endocervicitis*, the body of the uterus readily ridding itself of lingering infection, possibly through the exfoliation of epithelium which occurs at each menstrual period.

The symptoms of acute endocervicitis are limited to a feeling of weight and bearing down in the pelvis, sacral backache, and muco-purulent leucorrhea. By digital examination no change can be detected unless erosion is also present, but on inspection a ropy purulent discharge is seen escaping from the cervix, the mucosa of which may or may not be everted.

In chronic endocervicitis the same symptoms are present, and in long-standing cases there may be considerable pain in the hypogastric regions. On vaginal palpation it is often possible to detect an indistinct resistance in the bases of the broad ligaments, and pressure through the lateral vaginal fornices reproduces the pain of which the patient complains.

True cervical polypi whose origin is described above usually give rise to no symptoms other than irregular bleeding. Ordinarily this is not profuse and consists of "spotting" upon exertion, after taking a douche, or following coitus. Occasionally, however, polypi bleed freely enough to give rise to a considerable degree of anæmia. These polypi project from the cervix as small, pedunculated, bright red growths which bleed readily to the touch and, although quite soft, the larger ones are perceptible to the finger upon digital examination.

Treatment.—Trifling hypersecretion without infection can be cured by measures designed to relieve congestion, but applica-

tions to the interior of the cervical canal are entirely ineffectual for this purpose. Saline cathartics, prolonged hot douches, local blood letting once or twice a week accomplished by stabbing the portio-vaginalis in half a dozen places with a fine bistoury, and the application of a glycerine tampon are usually sufficient. Severe cases of hypersecretion can be cured only by destruction of the cervical glands or by amputation of the cervix according to Schroeder's method.

In acute endocervicitis it is possible to mitigate and even cure an occasional case by direct applications to the cervical canal, but the greatest care must be taken not to introduce instruments above the internal uterine orifice whose constriction offers a natural barrier to the ascent of infection. Powerful antiseptics do no harm in the cervical canal providing they are not escharotic, but none of them penetrate the glands which harbor micro-organisms. Local applications must for this reason be used very early and while the infection is still superficial in order to be of any service. The tenacious muco-pus which plugs the cervix must first be removed with a cotton-wrapped applicator, and following this the cervical canal is thoroughly mopped with tincture of iodine, pure carbolic acid, or strong nitrate of silver solution, being careful when carbolic acid is used not to allow it to drop on the vagina or vulva. Douches have no particular effect upon the cervical canal, but they relieve local congestion and maintain cleanliness of the vagina. Should the discharge persist more than a few weeks it is impossible to effect a cure by local applications alone, and they should likewise be abandoned if the infection spreads to the corporeal endometrium and the tubes.

In the instances of long-continued purulent cervical leucorrhea just mentioned, as well as those which are chronic when first seen, it is possible to effect a cure by dilating the cervix with Sims's dilators and making applications to it in a manner similar to that employed in sounding and treating a persistent inflammatory patch in the male urethra, but the risk of carrying infec-

tion into the cavity of the body of the uterus is too great to justify the adoption of this method.

The best non-operative treatment is that devised at the Johns Hopkins Hospital of light cauterization with the fine point of the thermo-cautery, making several linear strips throughout the length of the cervical canal and repeating the procedure at intervals of from ten days to two weeks. Deep cauterization is unnecessary and may lead to stenosis. In very obstinate cases, Schroeder's amputation should be performed as advised for hypersecretion.

Polypi should be twisted off or scraped away with the sharp curette and have their bases cauterized.

Laceration of the Cervix.—Some laceration of the cervix occurs at every labor but unless the injury is quite deep or infection takes place it is likely to heal without difficulty, although the lips sometimes fail to unite even under the most favorable circumstances and thus leave two adjacent surfaces which, while ununited, are completely covered by squamous epithelium. These injuries are of no importance. Deep lacerations and those which become infected fail either to unite or to become covered with squamous epithelium, and a chronic cervicitis and endocervicitis takes place which results in erosion, eversion of the lips, connective-tissue formation, and hypertrophy of the entire infra-vaginal cervix with obstruction of the cervical glands. Such cervixes subsequently may become malignant; in fact carcinoma of this portion of the cervix is rare unless it has been preceded by the chronic irritation of an unhealed eroded laceration.

Symptoms.—Lacerations which unite or become covered with squamous epithelium give rise to no symptoms.

Those lacerations which fail to heal in one or the other of the above-mentioned ways give rise to leucorrhea, and quite often to considerable discomfort which is referred to the hypogastric regions. There is also backache of the familiar sacral variety. The older gynecologists laid great stress upon a long

chain of remote reflex symptoms which were said to follow this injury and to be due to compression of nerves in the scar. It is likely that these so-called reflex symptoms are concomitants only, and that the only systemic results of cervical laceration are such as are produced by the pelvic discomfort and discharge. By themselves these are not sufficient to cause any serious general symptoms, and the latter are chiefly due to the worry and anxiety which many women suffer when unduly influenced by the idea that they have something wrong with the womb. An immediate diagnosis can be made by digital examination, although inspection through the speculum should not be neglected. The cervix is harder than normal, the everted lips can be recognized and there is often a palpable tender band extending from the apex of the tear into the vaginal vault or even into the base of the broad ligament. That the ovaries are sometimes tender is not surprising when their lymphatic supply is considered.

On examination with the speculum the condition is better appreciated, and erosion, Nabothian follicles, etc., can be seen.

Beginning malignant degeneration is not easily diagnosed in the hypertrophied eroded lips of a cervix which has been the seat of a long-standing laceration, and the tissues from such cervixes should be submitted to microscopic examination, before operation if intermittent bleeding has been present, and after operation in any event.

Treatment.—Much discussion has been provoked by the proposal to repair all cervical injuries immediately at the completion of labor. Owing to the risk of infection, the impossibility of coapting the wound edges so that they do not separate during involution, and the large number of tears which unite spontaneously, the greater number of obstetricians and gynecologists advise against routine interference at this time. In the event that deep laceration is productive of severe hemorrhage a suture about the apex of the tear is necessary, and under such circumstances complete repair may be attempted. Hirst's

proposal to repair such injuries during the puerperium is not practicable outside of well-regulated hospitals, and the question of its advisability is still sub-judice.

As stated above, healed lacerations with thin cervical lips, whether the edges are united or merely covered by squamous epithelium, need absolutely no attention.

Conversely, all eroded or thickened cervixes in women near the menopause should be repaired or amputated, preferably the latter.

During the active child-bearing period the proper course to pursue is a matter of judgment. If the symptoms are very annoying, a repair should be made regardless of the fact that another labor might reproduce the injury. If the symptoms are trivial no operation should be performed. It is possible in these latter cases to overcome the erosion temporarily and check the discharge by the daily use of prolonged hot douches, the local application of tincture of iodine, occasional scarification if the congestion is intense, and the use of the boro-glyceride tampon. Permanent cure is hardly to be expected, but sufficient relief may be obtained so that operation is not called for until a later period of the patient's life when subsequent labor is not likely to undo the operative results.

Hypertrophy of the Cervix.—Hypertrophy from cervicitis is one of the results of the irritation of an old laceration, but aside from this there are instances of so-called supra-vaginal elongation of the cervix. Some of these are congenital and are found in virgins. Others are found where there is great relaxation of the vaginal walls and outlet, when they simulate prolapse of the uterus, but the fundus is in its normal location and position. It is likely that the tugging of the attached bladder and vaginal walls is responsible for the condition, the body of the uterus being supported sufficiently well to obviate dislocation of the uterus as a whole.

The treatment of hypertrophy due to laceration is that of laceration itself. In congenital hypertrophy, circular amputa-

tion may be performed if the protruding cervix is a serious annoyance. If hypertrophy is associated with cystocele and relaxed vaginal outlet, the appropriate operations for these conditions should be performed, together with high amputation of the cervix.

Stenosis of the Cervix.—Atresia or complete occlusion of the cervix is a congenital anomaly and is treated under that heading. Stenosis or narrowing of the cervix to a pathological degree may also exist from birth, or it may be the result of an imperfect operation for cervical repair. Congenital stenosis either of the internal or external uterine orifice has long been considered one of the classical causes of dysmenorrhea, but in the absence of such menstrual anomalies as membranous endometritis, or menorrhagia with the formation of clots in the uterus, actual symptoms arising from congenital cervical stenosis are very rare.

Cicatricial contraction of a badly repaired cervix may on the contrary result in a high-grade obstruction, and be productive of pain from actual interference with the outflow of menstrual blood. Such pain is distinctly rhythmic and cramp-like in character.

Stenosis which is not cicatricial in origin is overcome readily by forcible dilatation under anæsthesia. Cicatricial stenosis of moderate degree may be cured by gradual dilatation, but if the scar tissue is very extensive and the degree of narrowing marked, re-operation by amputation is to be preferred.

TUMORS OF THE CERVIX

True fibromata and myomata originating in the infra-vaginal portion of the cervix are rare. When present, they form rounded encapsulated tumors which do not tend to be extruded through the cervical canal. Most so-called cervical fibroids are tumors of the supra-vaginal cervix or body of the uterus which have been partially expelled. The true cervical fibroid must be distinguished from adeno-carcinoma, and like any new growth

springing from the cervix it is under suspicion until proven not malignant by microscopic examination.

These tumors rarely attain great size and may usually be enucleated in the same manner as are small sessile tumors in the wall of the body and fundus of the uterus.

Carcinoma of the Cervix.—It is estimated that carcinoma of the cervix comprises one-third of all carcinomata occurring in women, and the cervix is the place of origin of the vast majority, possibly 90 per cent., of all uterine carcinomata. While cancer of the breast is also common, following cancer of the uterus and stomach in the order of frequency, its first symptom is the appearance of a tumor of which the patient is aware; while the first symptom of cancer of the cervix is bleeding to which the patient is accustomed, and to which she therefore attaches but little importance.

Etiology.—While the cause of cancer in general is unknown, it is certain that it has a marked predilection for areas which have undergone chronic irritation. Cancer rarely attacks a cervix which has not been injured.

Pathology.—Following the rule that the type of cancer is dependent upon the variety of epithelium covering the surface in which it originates, two distinct types of carcinoma are found in the cervix. These types are the squamous-celled carcinoma or epithelioma, and the glandular or adeno-carcinoma. Either of these types further may show its most marked growth outward from the surface of the cervix, forming a medullary or cauliflower carcinoma, or downward into the cervical tissue, forming an infiltrating carcinoma. It is said that the degree of vascularity determines the direction of the growth, the more vascular growing outward, the less vascular infiltrating. Both forms tend eventually to break down in the center and infiltrate at their bases. Histologically the squamous-celled cancer differs from normal cervical tissue in that the epithelial cells not only cover the surface but penetrate into the cervical tissue, the latter forming the stroma of the new growth. The cells are

closely packed together and give evidence of recent, rapid, irregular growth by the presence of mitotic figures, and epithelial pearls are sometimes seen.

Histologically the adeno-carcinoma shows the development of a new gland formation which differs from the normal glandular structure of the parts in that the glands are irregular in

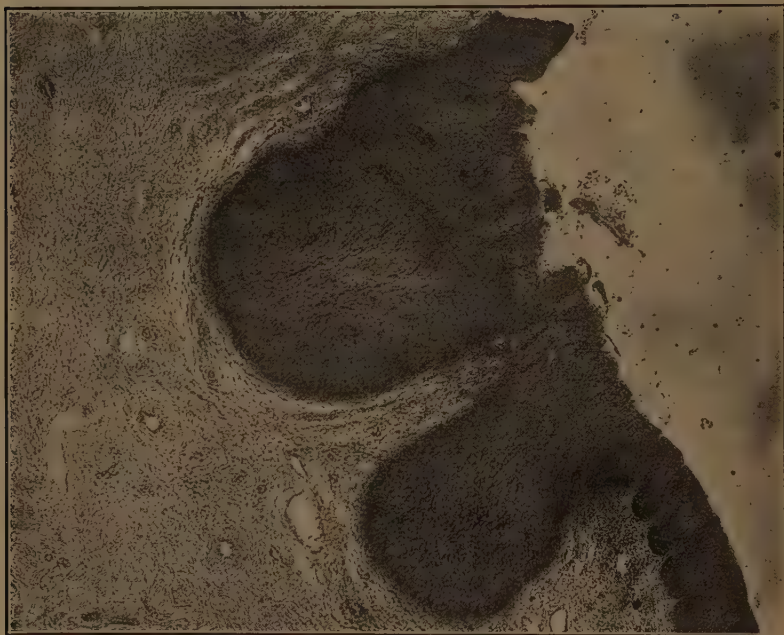


FIG. 81.—Early squamous celled carcinoma of the cervix. While one can never be certain that such atypical ingrowths as these would have become deeply infiltrating if allowed to remain, still we find all gradations and such a section as this must be diagnosed as early carcinoma.

shape and size, that they anastomose with each other, and that the gland lumen is lined in places by many layers of cylindrical epithelium instead of one. The larger works on pathology should be consulted with reference to the details of the various histological pictures which may be found.

The squamous-celled cancer affects principally the vaginal

portion of the cervix, while the cylindrical-celled affects primarily the tissues surrounding the cervical canal. Either form may by its growth invade the territory which the other by preference involves, and both alike sooner or later infiltrate the neighboring structures and spread into the connective tissue

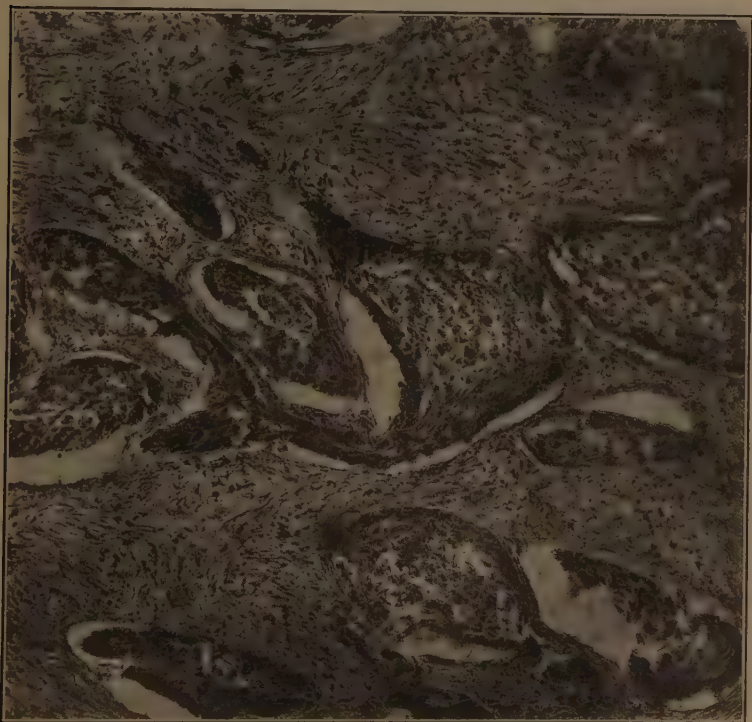


FIG. 82.—Far advanced squamous celled carcinoma of the cervix. Originating in the mucosa of the cervix but here infiltrating the musculature of the lower portion of the uterus. The infiltration in this case extended nearly to the serosa.

which surrounds the supra-vaginal cervix, technically known as the parametrium. Eventually the vaginal wall, the vesico-vaginal septum, and the recto-vaginal septum may be destroyed by the growth. Involvement of the parametrium usually implicates the ureters, narrowing their caliber and leading to hydronephrosis.

The neighboring lymph glands are frequently but not so regularly involved as is the case in some other portions of the body like the tongue and female breast, but the extension of the growth beyond its palpable limits is always surprising.

Symptoms.—Pain, foul discharge, and cachexia are the popularly accepted symptoms of cancer of the cervix, and they are, *when it has reached a hopeless stage*. Irregular slight hemorrhage after exertion, a douche, coitus, or even spontaneously, is usually the earliest symptom of cancer of the cervix, and supposed recurrence of menstruation after the menopause is past is always to be viewed with suspicion. Sometimes, but not often, a watery leucorrheal discharge precedes the appearance of hemorrhage. These earliest symptoms are followed by the triad first mentioned, with increase of the hemorrhage and marked foulness of the discharge.

Pain is an extremely uncertain and variable symptom and is dependent upon the structures attacked, but it is rarely absent in the later stages.

Hemorrhage usually becomes more marked as the case proceeds and may itself cause death, but an occasional case runs its course with comparatively little bleeding. Cachexia, probably due to absorption from the broken down surfaces, is progressive after it once begins and the fetor of late cancer is overwhelming. The temperature is irregularly elevated and the pulse is proportionate both in rate and quality to the degree of anæmia and exhaustion, and an irregular leucocytosis is usually present. While death may come from uræmia due to obstruction of the ureters, it is usually due to exhaustion from hemorrhage, toxæmia, and pain.

Physical Signs and Diagnosis.—Early in the disease digital examination reveals an area of induration in one or the other of the cervical lips, providing the growth is situated in the portio-vaginalis and not high up within the cervical canal. In the latter event nothing abnormal may be perceptible to the touch. One sign of pathognomonic importance is the sensation conveyed

to the examining finger of stony hardness or great density of the involved tissue, this dense portion not being perfectly regular in outline as is a Nabothian follicle. Scar tissue in the cervix is hard, but if one can so express it, the quality is different. The second pathognomonic feature of cancerous tissue, friability, cannot be made out in the infiltrating type until the disease has broken through the mucosa. On inspection of an early cancer through the speculum only the enlarged thickened lip may be apparent. Occasionally, minute yellow dots may be seen projecting outward into the mucosa before actual breaking down has occurred. The only enlargement of the cervix likely to confuse one in the early stage is fibroma, and while fibroma is hard it does not feel so dense and the outlines of the tumor are more likely to be regular. If nothing abnormal is apparent to the touch and sight, but suspicious subjective symptoms are present, the condition of the upper portion of the cervical canal should be investigated, and this being healthy the uterine body itself must be considered as diseased until the contrary can be proven.

Nothing should be taken for granted. If there is the slightest doubt as to the character of any thickened tissue, nodule, erosion, or ulcerated area, a portion should be removed for microscopic examination by a competent pathologist.

Late in the course of the disease the physical evidences are unmistakable. Either the cauliflower excrescence of the papillary form or the deep ulceration of the infiltrating type are perceptible to the touch, and both present the characteristic features of cancerous tissue, viz., stony hardness combined with great friability. Hemorrhage upon digital examination is also an invariable accompaniment of late cervical carcinoma. Inspection reveals the same condition as palpation, either cauliflower growth or deep excavation. Only two benign conditions are at all likely to lead to error, cervical gumma and sloughing sub-mucous fibroma. Cervical gumma is so rare as to be negligible. Sloughing sub-mucous tumors, which have been

extruded into the cervix, may give rise to foul discharge, bleeding, and pain, and on examination a broken down mass may be found in the vaginal vault, but these necrotic tumors are attached by a pedicle which extends into the uterine cavity, they are not dense, and unless the process is far advanced the mucosa covering them is plainly visible.

Treatment.—The treatment of carcinoma of the cervix is the same as the treatment of carcinoma in any other accessible location, radical extirpation so long as the disease is so localized that extirpation offers any hope of success, and palliative treatment when radical operation is not feasible. The diagnosis of operability is thus second in importance only to the diagnosis of the disease itself. Clinically, extension of cancerous infiltration into the parametrium to a sufficient degree to be palpable renders radical operation futile in the vast majority of instances, and marked infiltration renders a case positively unfit for such a procedure. Minor degrees of infiltration and fixation of the cervix may be due to inflammatory exudate proceeding ahead of the tumor, and on the grounds that the disease is necessarily fatal if treated in a conservative manner, that if recurrence does take place the horrible odor and hemorrhage may be lacking, when in doubt one always inclines toward exploration with a view to radical operation. The method of operation should be the most radical that is possible, and a brief description will be found in Chap. X, but so extensive a dissection should not be undertaken by any but the most expert operators. Ordinary vaginal hysterectomy does not permit removal of the tissue adjacent to the uterus and should be reserved for cases in which the disease is accidentally discovered at a *very* early date. Schauta's radical vaginal hysterectomy offers more hope than vaginal hysterectomy as ordinarily performed, but it requires even more skill than the extensive abdominal operation.

Cases not Suitable for Radical Operation.—Notwithstanding all that has been said in favor of early diagnosis, the vast majority of all cases of cancer of the cervix arrive in the surgeon's

hands too late for any possibility of radical operation and the various palliative measures must be carefully considered. These consist of vaginal hysterectomy, high amputation of the cervix with the cautery, extensive destruction with the cautery by Percy's method, and radiotherapy.

Vaginal hysterectomy may be chosen when infiltration about the cervix is trifling, and although recurrence at the site of operation is almost certain to occur, vaginal hysterectomy in most instances does prevent the horrible odor and hemorrhage of open ulceration into the vagina. In view of the fact that cauterization seems to inhibit the growth and even destroy cancer cells at some distance from the primary tumor, the Byrne operation with the cautery is the choice in most instances rather than vaginal hysterectomy. In late cases with large cauliflower masses projecting into the vagina, or deep excavation of the cervical tissue, Percy's method appeals to the author as the most satisfactory yet devised, and further experience must determine whether it is not applicable to early cases as well.

Sometimes even a palliative operation is not advisable, and this is true when the growth has so seriously encroached on the bladder or rectum that any interference would open these viscera and produce an immediate fistula.

For a short time reports of cures by means of the X-ray gave rise to the hope that an adequate means for dealing with inoperable cervical carcinoma had been discovered. At present less is heard of this and more of the possibilities inherent in destruction by radium. It seems to have been demonstrated beyond question that exposure to large doses of radium destroys cancerous tissue more rapidly than it does the normal tissue at the edge of the new growth, and some surprising results have been reported. Making due allowance for over-enthusiasm, it is probable that some types of carcinoma really are cured by radium, and any inoperable case should be given the benefit of this treatment, providing a sufficient quantity of radium is available and in the possession of an expert in its use. The limitations imposed by

the small amount of the metal in existence, and the extraordinary expense attached to its use together with its concentration in a few hands, renders it impossible to apply it at all extensively or to ascertain the permanency of reported cures.

When treatment of any kind proves ineffectual and even palliative operation is without avail, keeping the parts clean with douches of 1-1000 permanganate solution, 1-500 or 1-1000 formalin, or if hemorrhage is a marked symptom, tannic acid in 1 per cent. solution is about all that can be done locally, although many other methods of chemical cauterization and hardening have been advocated. Patients who are the victims of hopeless cancer of the cervix should be given as much morphine as is demanded for the pain, not only to relieve the latter but to promote mental comfort and quiet that apprehension which is so invariable an accompaniment of the disease.

OPERATIONS ON THE CERVIX

Dilatation.—While dilatation of the external uterine orifice may be performed in the office, dilatation of the cervix as a whole is distinctly not an office operation. Dilatation of the external orifice may be done with graduated hard rubber bougies which are introduced one after the other in successively larger sizes as is done in the passage of sounds for stricture of the male urethra, but these bougies should not pass the internal orifice, and even this trifling procedure is dangerous if the patient has cervical gonorrhea or any form of pelvic inflammatory disease. The bougies should be sterilized by prolonged immersion in strong bichloride solution, and every effort should be made to secure asepsis of the external uterine orifice and cervical canal. Rapid dilatation is most frequently done as a preliminary to curettage in order to permit the easy introduction of instruments through the cervical canal. It is also of some temporary use to relieve certain types of dysmenorrhea. Dilatation of the cervix is contra-indicated if acute or chronic pelvic inflammatory

disease is present or if acute infection of the cervical mucosa exists.

The vagina should be cleansed by first scrubbing it with soap and water, then douching with sterile water, followed by $\frac{1}{2}$ of 1 per cent. creolin or lysol. The patient should be anæsthetized and placed in the lithotomy position. With the perineum retracted, the anterior lip of the cervix is grasped with volsellum forceps and steadied, while the dilator is introduced through the internal uterine orifice. Occasionally it will be found necessary to use a small dilator or even a large hæmostat in order to dilate the external orifice sufficiently to permit the introduction of the larger instrument, whose blades should expand parallel to each other. Dilatation should be made cautiously until the resistance of the cervical tissue is thoroughly tested. The dilator is opened as far as can be done easily by hand pressure (not by the screw with which most instruments are provided), held for a short time, turned into another quadrant of the cervix, opened and held again, and so continued until the canal is stretched as far as necessary. The dangers are that infectious material may be forced into the cervical tissue by the pressure of the blades, and that the cervix or lower segment of the uterus may be ruptured. The former can be avoided by a proper selection of cases, the latter by using hand pressure only and that cautiously and slowly, never by sudden forcible jumps of the instrument.

The after-care consists only of rest in bed for two or three days.

REPAIR OF CERVICAL LACERATION

Immediate Repair.—For reasons previously given immediate repair of the lacerated cervix is indicated only in case a deep injury is causing severe hemorrhage. Aseptic precautions should be most pedantic. No preliminary douches are required as the vagina is presumed to be aseptic at the close of labor, and anæsthesia usually is unnecessary and a waste of

valuable time. The vagina is held open with retractors and the uterus pushed downward by an assistant who makes pressure upon the fundus, while the cervical lips are caught with volsellum forceps and drawn to the vulva. The bleeding is materially lessened by this maneuver alone. Chromic catgut sutures are used, the first one taking up the tissues above the angle of the tear. This stops the bleeding at once, when either interrupted or continuous sutures may be introduced in a careful manner, closing the injury down to the external uterine orifice.

Secondary Repair, Trachelorrhaphy.—Small thin cervical lips are essential if a proper secondary repair of an old laceration is to be made. If the patient is past the child-bearing age or the cervix is much hypertrophied, amputation is the preferable operation. The contra-indications to trachelorrhaphy are pelvic inflammatory disease and acute infection of the body of the uterus or the cervix itself.

The patient is anæsthetized, placed in the lithotomy position, and the vagina cleansed as for dilatation. The cervix is exposed by perineal retraction, and each lip is caught with a volsellum forceps at the exact point which will form its side of the new external orifice. The new cervical canal is next outlined with the knife, and the apex of the tear incised at either side of the superior end of the new canal. The strip of mucosa which is left in the middle of either flap should be a little broader than the normal canal, and its termination at the external os should be wider than the remainder, so that when the lips are approximated the new orifice will be trumpet-shaped. The scar tissue and mucous membrane of each lip on both sides of the newly outlined canal are then removed either with knife or scissors. Bleeding is free but rarely needs any other attention than the proper placing of the sutures.

The first suture on either side should enter one lip on the vaginal mucosa, emerge on the mucosa of the undenuded strip of the same lip, re-enter on the mucosa of the undenuded strip

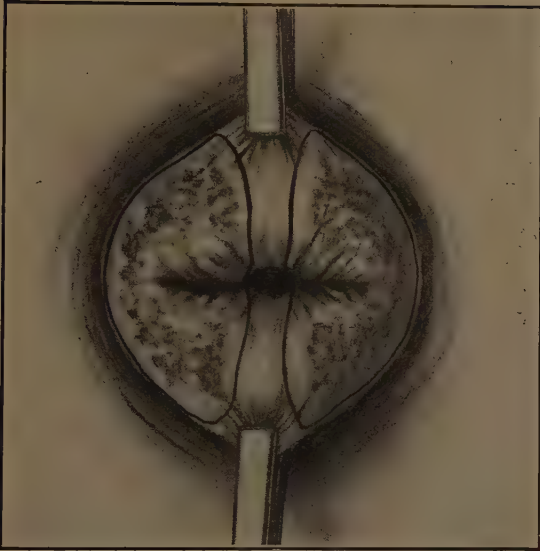


FIG. 83.—Trachelorrhaphy. "The new cervical canal is outlined with the knife."

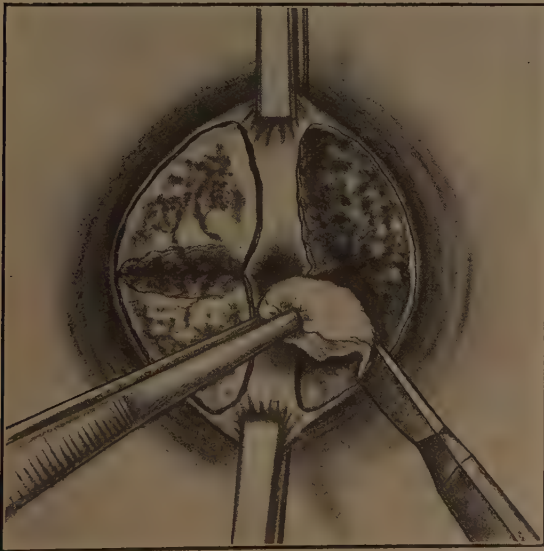


FIG. 84.—Trachelorrhaphy. The apex of the tear has been incised on both sides. On one side the scar tissue is in process of removal.

on the opposite lip, and emerge opposite its point of entrance. *This stitch when tied should lie at or above the apex of the denudation.* A sufficient number of stitches should be introduced to secure approximation, usually three or four on each side. None of the sutures should bite too far toward the center of the strip

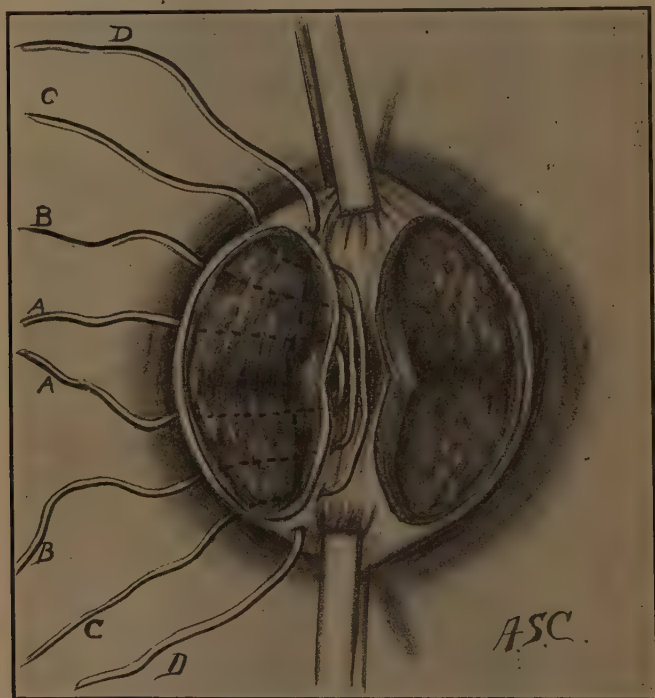


FIG. 85.—Both sides denuded. Stitches laid on one side. New external os will be trumpet shaped.

of mucosa left in the middle of the lips, for while permanent stenosis could not result if this were done, retention of uterine secretions during the time the stitches were in place would be certain to occur. The stitches are not tied until all are in place when they are knotted from above downward snugly enough to assure hæmostasis, but no tighter than is necessary for this

purpose. Suture material should be chromic gut if perineal work is done at the same sitting; if not, either silkworm gut, silver wire, or chromic gut at the fancy of the operator.

After-care.—Rest in bed for eight or ten days is judicious, although it is not likely that healing would be disturbed if the patient were up much sooner. No douches are used at first as they serve no useful purpose and may be the source of infection.



FIG. 86.—All sutures tied. The first stitch in each side is "tied above the apex of denudation."

If chromic catgut has been used the discharge becomes rather irritating after five or six days and saline or boric acid douches are necessary. If these are carefully given in an aseptic manner there is no risk of infection after this time.

Secondary hemorrhage is more common after repair or amputation of the cervix than after any other operation upon the female genitalia, and this is due to imperfect placing of the first stitch. Should hemorrhage occur the proper treatment is the introduction of a suture high enough on the lateral wall of

the cervix to control the circular artery. Excessive menstruation at the first period after operation is also common, and it is a wise precaution to advise rest in bed at this time.



FIG. 87.—Modified Schroeder amputation of cervix for erosion or laceration. Line of incision which splits the cervix.

AMPUTATION OF THE CERVIX

Schroeder's Amputation and Its Modification.—The Schroeder amputation of the cervix is limited in its indications to intractable cases of endocervicitis, but by a trifling modification

it becomes the most appropriate operation for those cervical lacerations in which amputation is preferable to repair.

In the Schroeder amputation the cervix is split by an incision



FIG. 88.—Modified Schroeder. The cervix has been split and the lips are held widely apart.

which extends transversely across its inferior extremity, and which penetrates deeply enough to expose all the diseased mucosa when the lips are held widely apart. At the bottom of this incision a cut is made upon each lip of sufficient depth

to penetrate the mucosa and at right angles to the first incision. A thin shaving is then split from the internal surface of each lip. This shaving includes all the cervical mucosa inferior to the last incision and some of the cervical tissue at either

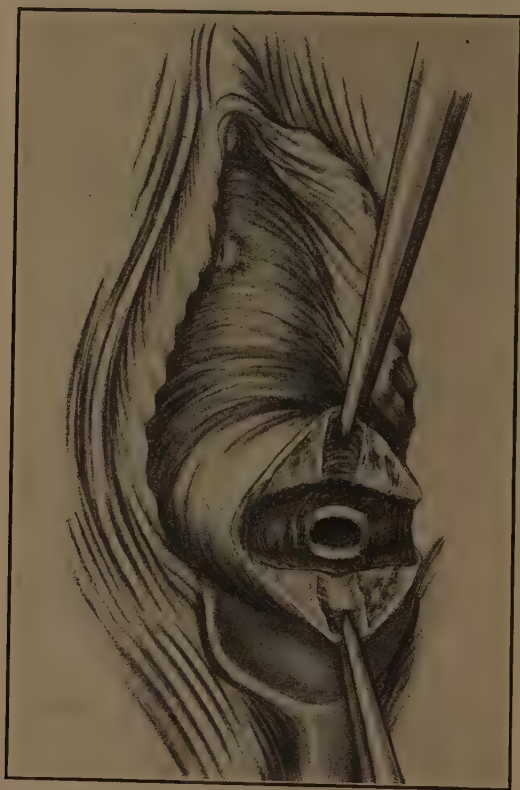


FIG. 89.—Modified Schroeder. At the bottom of the first incision a cut has been made upon each lip "at right angles to the first incision."

side of the canal. The cervical lips are then stitched in such fashion as to make a new canal lined by squamous epithelium. This is done by infolding them by passing a suture from the center of each lip to the stump of cervical mucosa left high in the wound, and thereafter applying a sufficient number, usually

two or three to each lip, to encircle the entire canal. When this is done a small wound remains on each side of the cervix and this is closed by one or two sutures.

A modification by which the operation becomes applicable

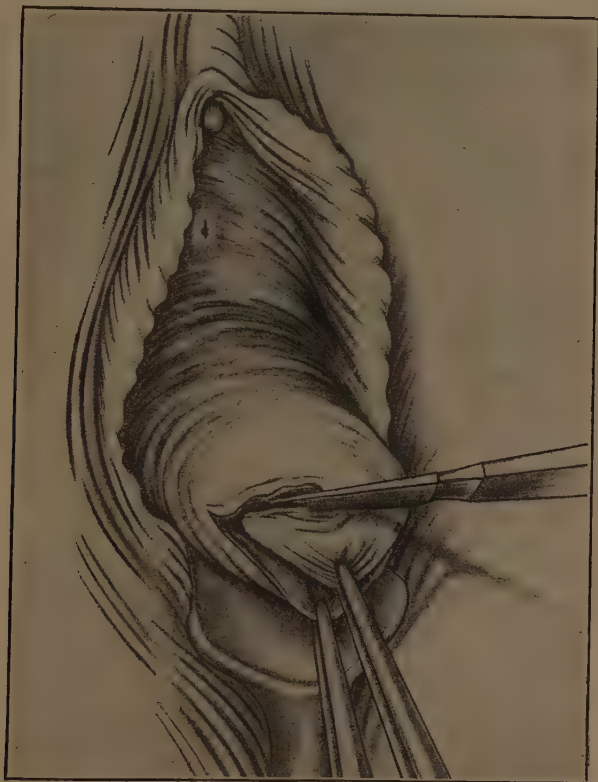


FIG. 90.—Modified Schroeder. "A thin shaving is then split from the internal surface of each lip." This shaving may be wedge shaped, base downward.

to deep laceration with hypertrophy, consists in making the shaving which contains the cervical mucosa wedge-shaped, the base of the wedge being taken from the inferior end of each lip. The wedge should be as thick as necessary in the individual case, and in greatly hypertrophied cervixes may include all of

each lip up to the attachment of the vaginal wall. The sutures are passed in the manner above described and are intended to so reconstruct the cervical canal as to cover all raw surfaces

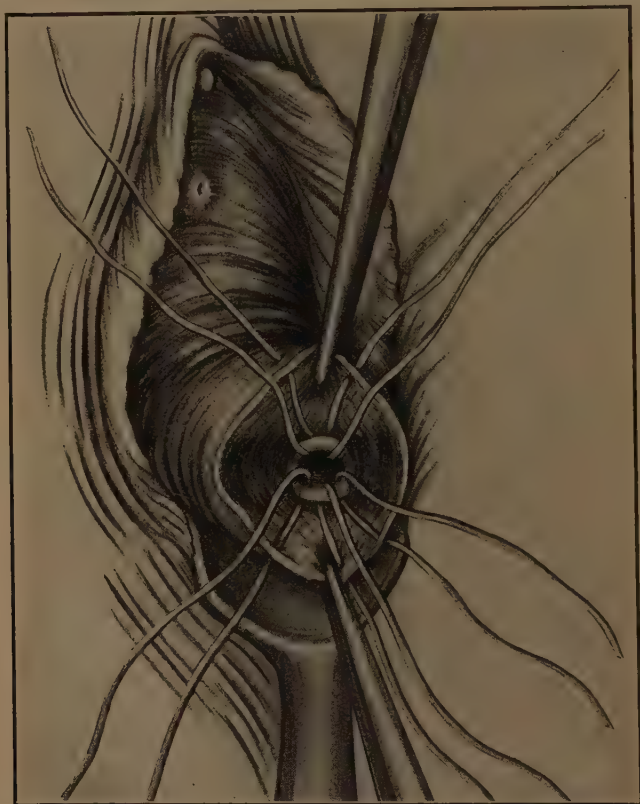


FIG. 91.—Modified Schroeder. The cervical lips are infolded to meet the mucosa of the cervical canal by sutures which are here shown laid but not tied.

with squamous-celled mucosa. If bleeding is free, the highest stitch on either side should include a deep bite of cervical tissue.

Circular Amputation.—Circular amputation is preferred for hypertrophic elongation of the cervix and for the supra-vaginal elongation which occurs in prolapse of the uterus.

After drawing the cervix down its junction with the vaginal wall is noted, and at this point a circular incision is made which

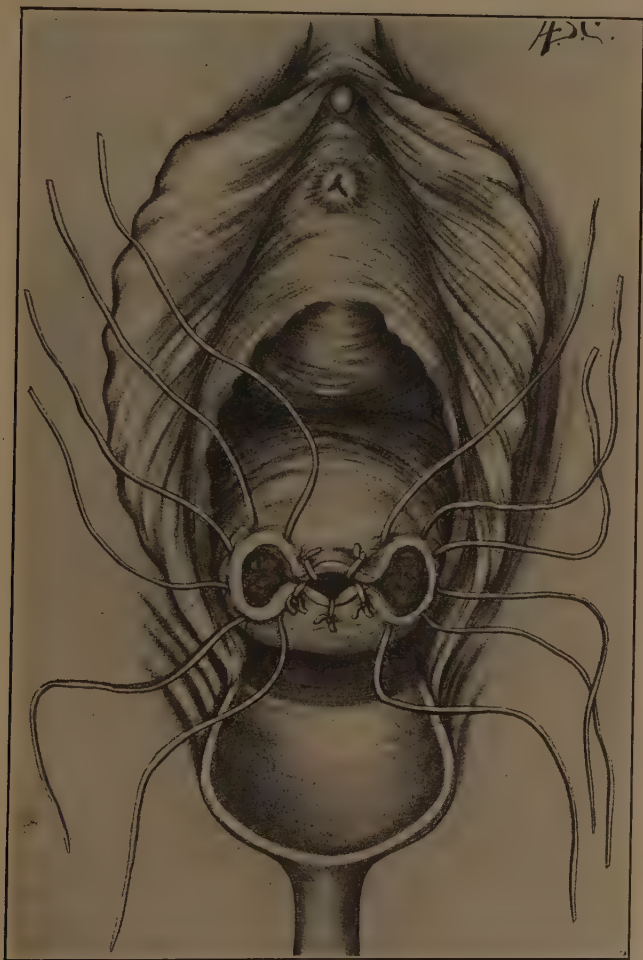


FIG. 92.—Modified Schroeder. The stitches reconstructing the cervical canal are tied. A small wound remains on each side through which sutures are shown not tied.

extends through the mucosa and down to muscular tissue. The cervix is steadied by traction, while the vaginal wall is separated

from it by pushing off its connective-tissue attachments as far as necessary, all pressure being directed against the cervix. The

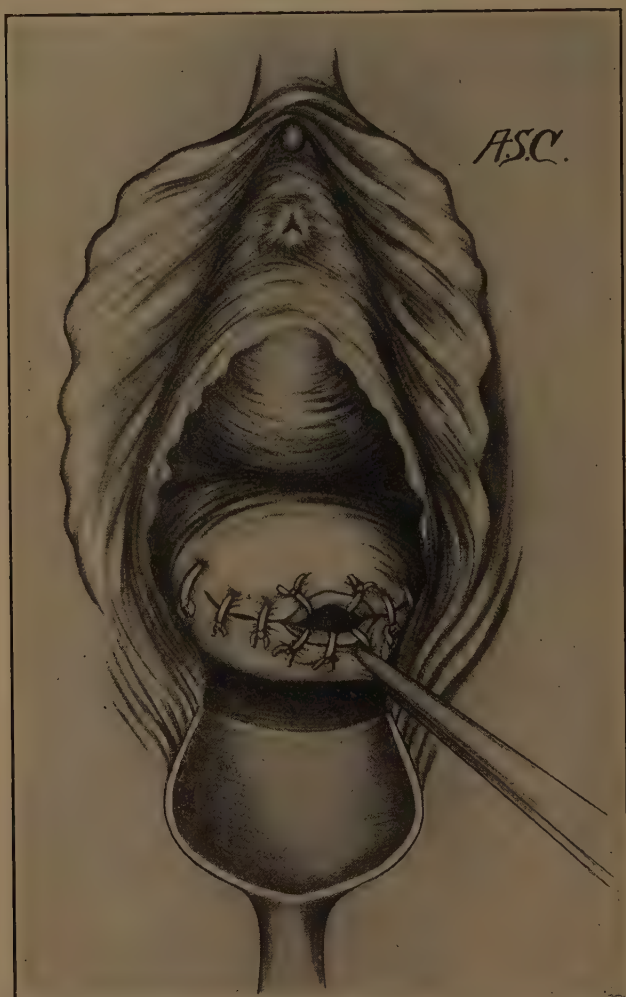


FIG. 93.—Modified Schroeder. All sutures tied. The last one at each side is tied above the apex of denudation in order to certainly control hemorrhage.

bladder may be pushed off anteriorly if it is desirable to amputate very high. The cervix is now removed by a transverse cut

which at first passes through the anterior half of the cervix only, as the stump retracts and is sutured with difficulty if the incision

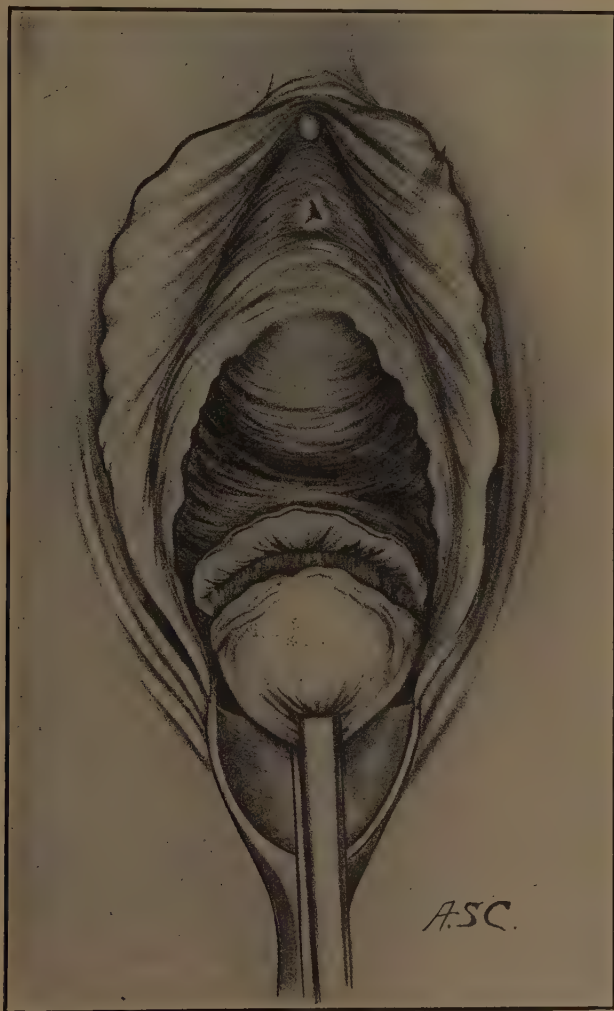


FIG. 94.—Circular amputation of cervix. An incision is made at the junction of the vaginal and cervical mucosa which encircles the cervix. Anterior view.

extends completely through it. One or two sutures are now introduced which unite the vaginal and cervical mucosa. These

are passed deeply in order to control hemorrhage. The posterior half of the cervix is now removed while the stump is held

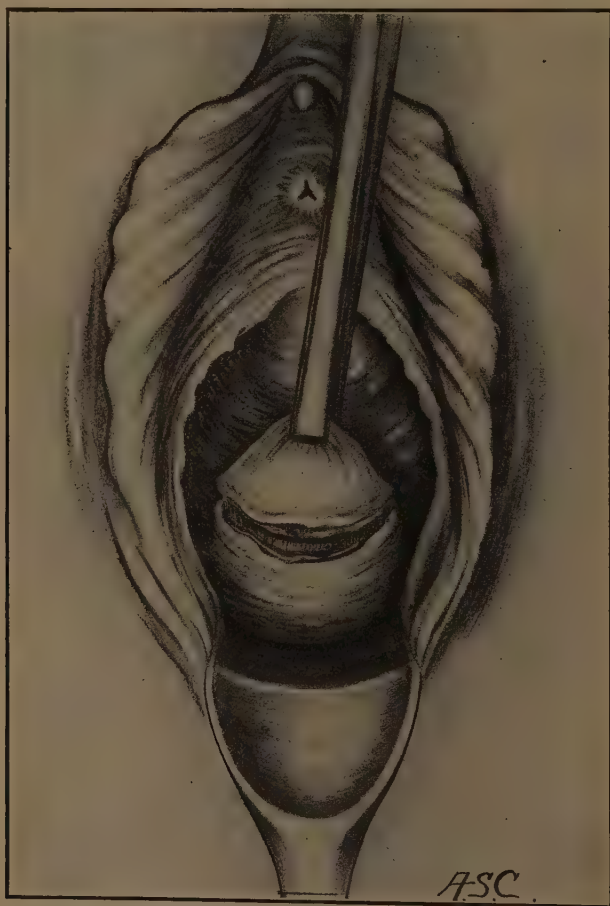


FIG. 95.—Circular amputation of cervix. An incision is made at the junction of the vaginal and cervical mucosa. Posterior view.

by the sutures already introduced, and a similar set is laid on the posterior half.

Stitches are now introduced from vaginal to cervical mucosa around the circumference of the cervix, and are tied after all

are in place. Owing to the redundance of vaginal wall there is a marked puckering of the margins and the completed opera-

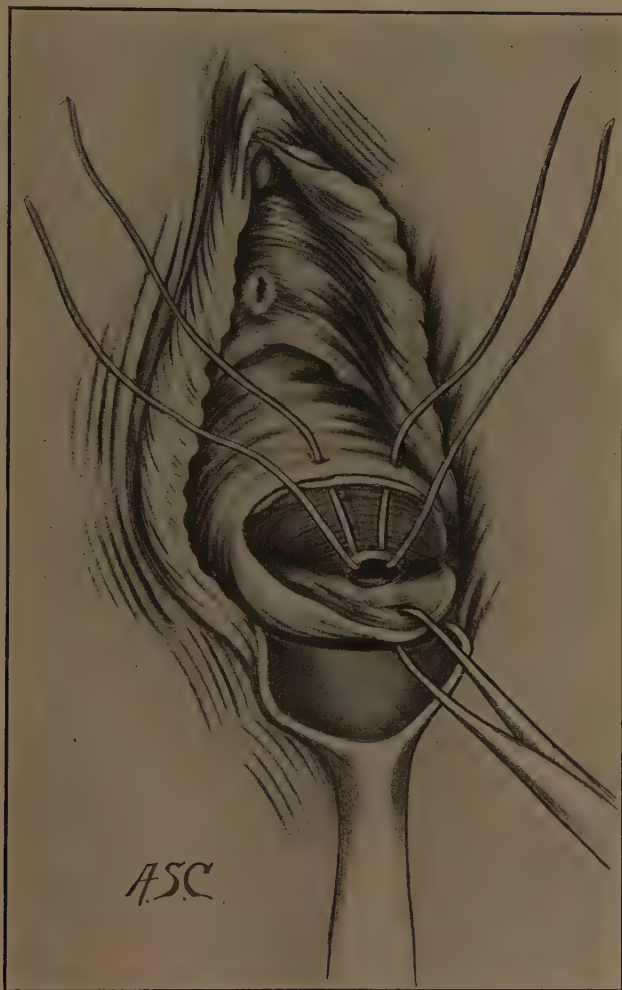


FIG. 96.—Circular amputation of cervix. The cervix is now removed by a transverse cut which passes through its anterior half only and one or two sutures are introduced from vaginal to cervical mucosa.

tion has an unfinished appearance which, however, smoothes out and disappears after healing is complete.

Amputation with the Cautery.—This operation is done for malignant disease, and is feasible only with the heavier electric

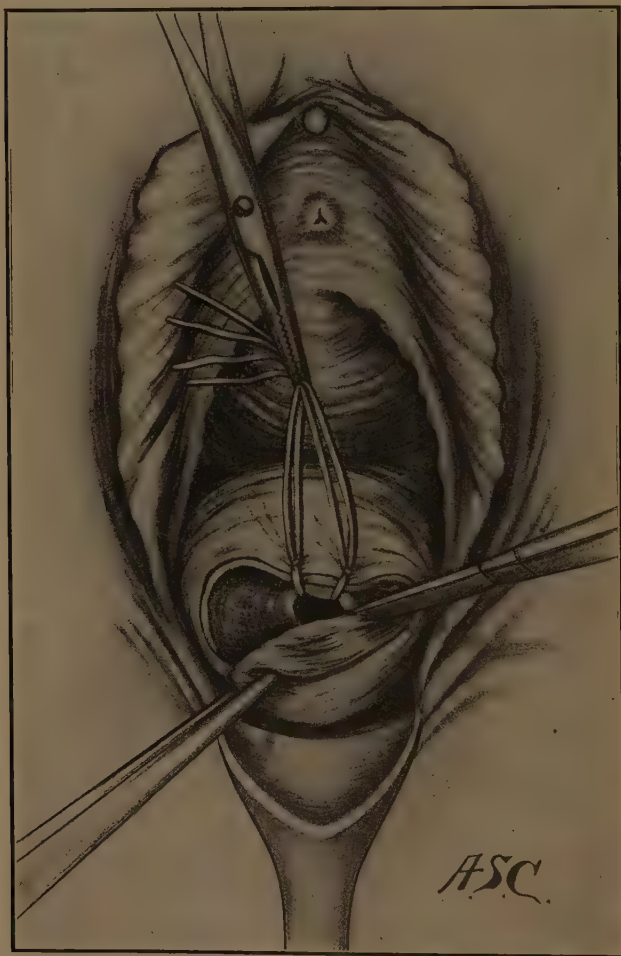


FIG. 97.—Circular amputation of cervix. The posterior half is now removed while the stump is held by the sutures already introduced.

cautery knives as the ordinary Paquelin cools too quickly to do good work.

Any redundant masses of new growth which obscure the view are cut away, and the cervix is then amputated as close to the surrounding tissue as it is possible to go without entering the

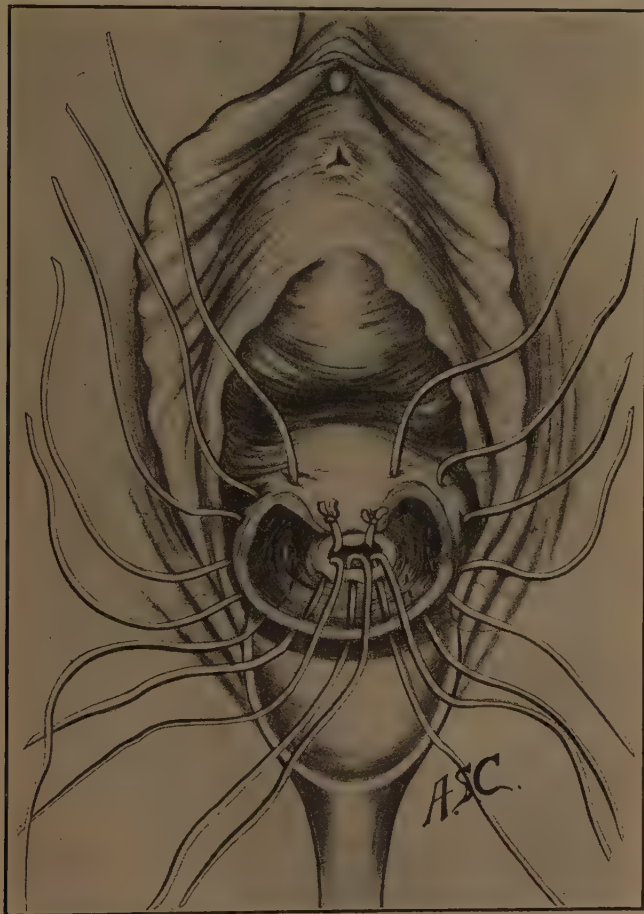


FIG. 98.—Circular amputation of cervix. Stitches are now introduced to complete the new cervical canal and close the gaps at either side.

peritoneal cavity, bladder, or rectum. The amputation should go high into the uterus, and when completed the excavation left is cone-shaped, base downward.

The cautery blade should be kept at a dull cherry red heat, at which temperature the hemorrhage usually is trivial. If a

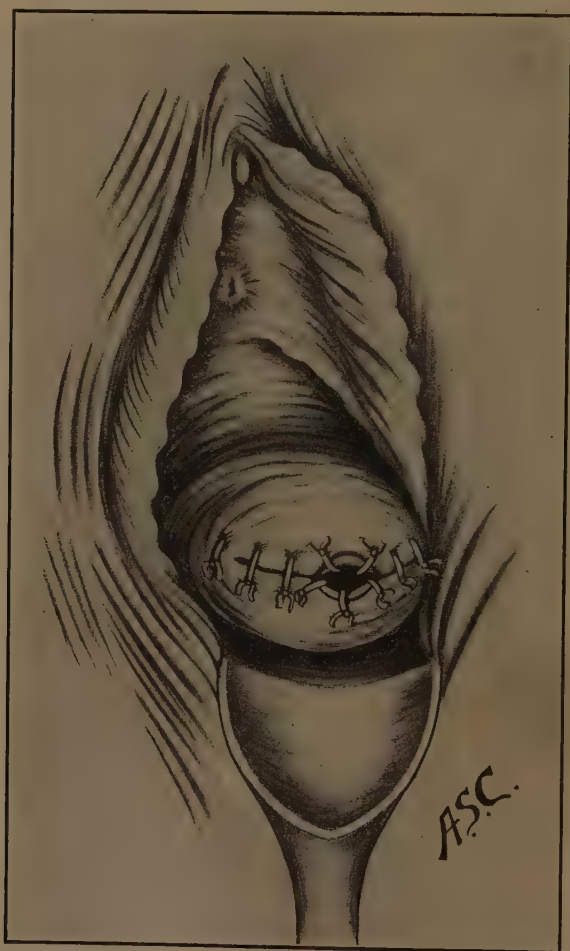


FIG. 99.—Circular amputation of cervix. All stitches tied. The two most external are tied above the apex of denudation.

bleeding point persists, pressure is made upon it with the heat lessened, and it is only rarely that a suture or ligature is needed.

If the uterus cannot be drawn well out of the vagina, extreme

care is needed to avoid burning the vulva and vaginal walls, and with the heavier cauteries a water-cooled speculum is almost a necessity. The cavity left after amputation should be loosely packed with iodoform gauze which is allowed to remain for four or five days, after which it is removed and deodorizing douches used as the slough produced by the burn becomes detached and comes away.

Curette and Cautery.—This operation has been used extensively as a palliative measure in cases of cervical carcinoma in which radical operation was out of the question, but it bids fair to be superseded by massive cauterization as devised by Percy because the latter requires no cutting, and most surgeons of wide experience question the wisdom of opening any surfaces for absorption as is bound to be done when cutting instruments are used. In any event the curette and cautery should be reserved for those cases in which the predominant indication is to relieve overwhelming fetor, and no idea is to be entertained either of cure or prolongation of life by this procedure.

A large sharp curette is used to separate and remove all friable tissue until the instrument impinges upon the firm structures underlying it. During this step the bleeding is free and it is therefore desirable to complete it as rapidly as possible. After this is finished the dome-shaped cautery is applied to the raw surface until it is thoroughly charred and bleeding has ceased. The procedure may end at this time, or, preferably, the cauterization may be continued by the application of zinc chloride. For this purpose a small tampon is soaked in a 50 per cent. solution, squeezed dry, and inserted into the crater left by the operation. The vagina is immediately filled with gauze wet in a strong solution of bicarbonate of sodium which neutralizes any excess of the zinc salt and prevents its coming into contact with the vaginal walls or vulva. The vaginal dressing should be removed in 24 to 48 hours and the tampon allowed to remain until it becomes loose, which usually requires a week or 10 days. Traction upon the thread which is left attached when

the tampon is introduced brings away the tampon and a cast of the tissue to which it has been applied. Moderate pain is present for a day or two, but not more than is easily borne. After removal of the tampon antiseptic and deodorizing douches should be used, and in very favorable cases the walls of the entire cavity become covered with healthy granulations which cicatrize and leave only a pit in the vaginal vault.

The same caution is necessary as in amputation to see that the peritoneal cavity or neighboring viscera are not penetrated.

Massive Cauterization.—Encouraged by the results obtained by amputation with the cautery, Percy of Galesburg, Illinois, has developed a method of massive cauterization which is based upon the ease with which cancer cells are destroyed by a moderate degree of moist heat. The cautery iron itself applies only dry heat but the tissue juices near the iron are converted into steam, while those at some distance are sufficiently heated to retard or destroy the cancer cells in their vicinity. Complete details of this method can be found in articles in the *Journal of the American Medical Association* and other journals mentioned in the references. The salient points briefly are as follows: Two operators are required, one to open the abdomen and the other to handle the cautery.

After preliminary sterilization of the anterior abdominal wall, the abdomen is opened through a median incision and all coils of intestine removed from the pelvis and held in the upper abdomen by pads. The operator who opens the abdomen then turns his attention to the degree of heat which the vaginal operator now applies by means of cautery irons kept hot by an electrical device. Before these are used a water-cooled speculum is introduced into the vagina which effectually prevents burning of the vulva or vaginal walls.

The cautery is applied to the cancerous tissue in the vaginal vault by holding the iron against each portion of it, while the fingers of the abdominal assistant are kept in contact with the peritoneum covering the abdominal surface of the same area.

Cauterization is continued at each point to which the iron is applied until the fingers in the abdomen are distinctly uncomfortable when it is shifted to another locality, and this is continued until the uterus and infiltrated parametrium are converted into a thin-walled, freely mobile sac.

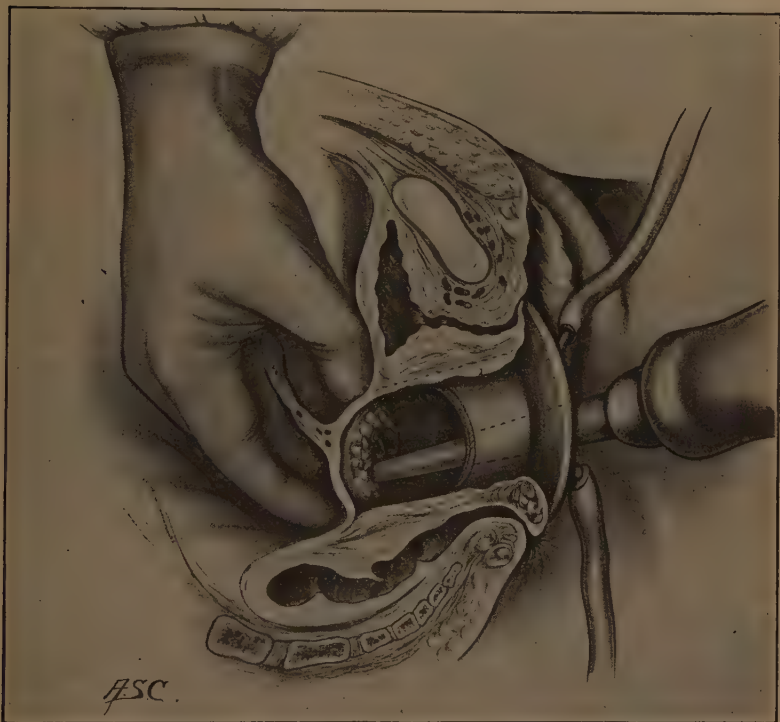


FIG. 100.—Massive cauterization by Percy method. Sagittal section. The fingers of the abdominal assistant are held in contact with the peritoneum covering the area attacked through the vagina by the cauter.

If the infiltration extends toward the bladder wall, a thermometer is introduced through the urethra to indicate the limit of safety in that direction which is approximately 150°F .

Modifications of the operation are devised for extensive intra-abdominal involvement. In these a water-cooled speculum is

passed through the incision into the abdominal cavity and the cautery applied directly to the peritoneal-covered surface. This cannot be recommended until more experience has been gained, and in fact it is better for the beginner to be careful not to produce ureteral, vesical, or rectal fistulæ until the

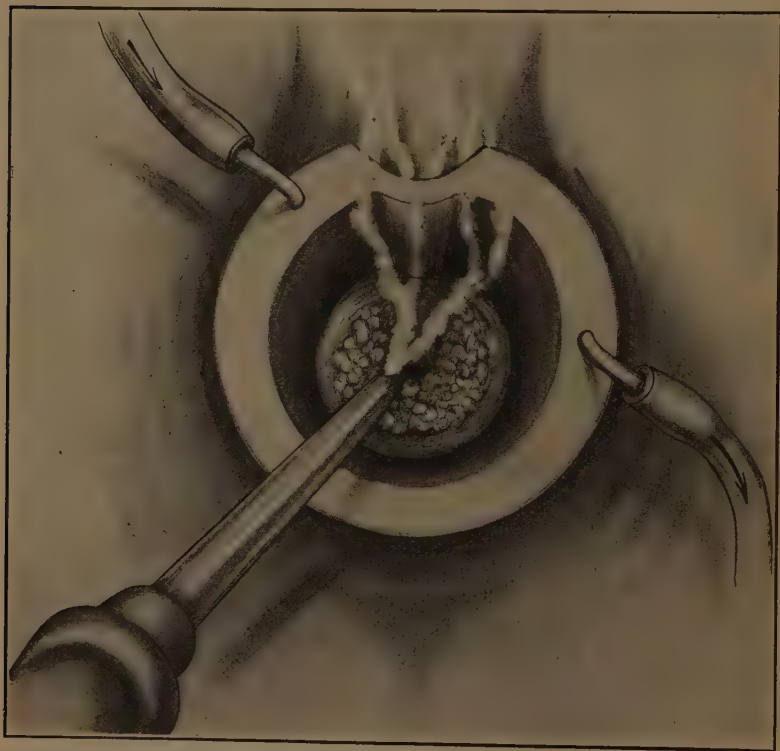


FIG. 101.—Massive cauterization by Percy method, water cooled speculum. Cautery iron applied to cancerous area.

method has obtained acceptance as a recognized surgical procedure.

Aside from a moderate dose of narcotic no general or local after-treatment is used and the patient is treated as any other abdominal section might be.

Percy has recently called attention to the fact that this procedure is most effectual when the cautery is not sufficiently hot to cause charring, carbonization markedly retarding the diffusion of heat from the cautery head through the tissues.

The proper carrying out of this operation necessitates prolonged anæsthesia, from one to two hours, but aside from this the operation seems to present but little immediate danger, although late secondary hemorrhage may be profuse enough to jeopardize life.

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CHAPTER VIII

DISEASES OF THE UTERINE BODY

Endometritis.—Under this heading are classed a number of dissimilar diseases, and a variety of symptoms are incorrectly regarded as evidence of the presence of endometritis.

In the following discussion an attempt will be made to classify endometritis from a clinical standpoint and to state briefly the pathology and symptoms of the clinical types, although it is certain that the pathological findings and clinical symptoms often fail to agree.

Acute Endometritis.—Acute non-puerperal inflammation of the endometrium may occur during the progress of certain specific systemic diseases such as scarlatina, it may be produced by the invasion of any of the pyogenic cocci, and most frequently is caused by the gonococcus of Neisser.

It is not known whether the ordinary pyogenic organisms can attack the intact endometrium or whether an abrasion or injury to the mucosa is necessary, but it is certain that gonorrhea most frequently extends directly upward from the cervical canal to the uninjured mucosa of the uterine body.

The ordinary type of acute suppression of menstruation which follows exposure to cold and wet and is succeeded by a profuse flow probably is an acute congestion, and it is not known whether micro-organisms play any part in its production.

Puerperal endometritis is a subject by itself and does not concern us at the present time.

In the non-puerperal form due to staphylococci, streptococci, etc., the germs gain entrance to the uterine cavity through the use of unclean instruments such as the uterine sound or dilator, and occasionally through the introduction of unclean

solutions used for vaginal douching, the tip of the nozzle being accidentally pushed into the cervical canal.

While instrumentation is not necessary for the introduction of gonococci, they may be implanted on the endometrium of the body by instruments which are passed through an infected cervix and above the internal uterine orifice.

Acute non-puerperal endometritis is itself an insignificant disease but its complications may be of grave importance.

The type due to exposure subsides spontaneously in a few days as does that associated with the general infections, but gonorrheal endometritis almost invariably extends to the tubes, while ordinary pyogenic infection may result in ovarian abscess, local peritonitis, general peritonitis, or virulent septicæmia.

Pyogenic endometritis in the non-puerperal uterus is not so disastrous as is the same disease in the puerperal uterus, the raw surface and large vessels and lymphatics of the latter presenting a much more favorable opportunity for widespread dissemination.

Pathology.—The pathological picture in acute endometritis is that of any acute inflammatory condition of a mucous membrane; round-cell infiltration and thickening of the interstitial tissue, with widespread separation of the glandular structures.

Symptoms.—Sudden suppression, should the patient be menstruating, followed by a prolonged rather profuse flow associated with sub-acute pelvic pain, is the predominating symptom. Leucorrhœa may not be present at first but follows soon after the subsidence of the earliest symptoms. If the inflammation is due to gonorrheal or pyogenic infection the leucorrhœa is purulent and may be blood-stained. Otherwise it is due to hypersecretion of the uterine glands and is serous in character.

The temperature is but slightly elevated in mild cases and reaches a high point only in the more serious infections.

Palpation shows some tenderness over the lower abdomen, and the uterus is sensitive to the touch upon digital or bi-manual examination. In severe cases it may be difficult or impossible

to distinguish between the symptoms produced by acute endometritis and those caused by its complications, and indeed this differentiation is unnecessary, endometritis itself being an evanescent affair and losing its importance when complications occur. The symptoms of acute salpingitis, oophoritis, and pelvic peritonitis are frequently mistaken for those of endometritis, and they can be ruled out only by a careful bi-manual examination in which all the pelvic structures, aside from the uterus, are found to be normal.

Treatment.—Local treatment, that is, treatment applied directly to the interior of the uterus, is distinctly contraindicated. Rest in bed is the first essential, and if it is quite certain that the peritoneum is not involved a saline cathartic should be administered. Small doses of Dover's powder combined with phenacetin or aspirin relieve the discomfort, and either hot or cold applications may be made to the lower abdomen. Sometimes an ice-bag and at others a poultice affords relief, and in the present state of our knowledge the sensations of the patient are the only criteria by which we may decide which is the better.

Very prolonged hot douches are usually comforting, but it is somewhat paradoxical to apply an ice-bag over the fundus and hot water to the cervix.

Perhaps as good a rule as any is to use cold applications to the abdomen at the outset, and change to warm, together with hot douches, as the temperature subsides and the symptoms abate.

Chronic Endometritis.—Chronic endometritis may be divided into two *clinical* forms, the purulent and the hemorrhagic.

Chronic purulent endometritis of the body of the uterus is a rare occurrence but it sometimes follows an acute attack which was due to pyogenic infection. Uncomplicated *chronic* endometritis of the uterine body of gonorrheal origin, is almost unknown, the greater number of cases so diagnosed being either gonorrheal endocervicitis or gonorrheal salpingitis.

The most prominent symptom is indicated by the name, a discharge of pus from the cavity of the uterus. In association with this there may be some pain and pelvic discomfort and also some disturbance of menstruation, but the purulent discharge is the predominant symptom. In order to ascertain the origin of the discharge the Schulze tampon may be used. This is made like the ordinary tampon except that the string is tied in both directions. The tampon should be applied dry and with the crossing of the threads directly under the external orifice of the uterus. Examination of the tampon after it has been in place 24 hours will show a thin sero-pus or pus alone if the discharge is corporeal, but pus intimately mixed with mucus if the discharge is cervical. The uterine discharge is at the mid-portion of the tampon, any excess of vaginal secretion being found at its edges.

Before the diagnosis of uncomplicated chronic endometritis can be established, a careful bi-manual examination must have ruled out any possible inflammatory disease of the tubes or ovaries.

Treatment.—Local applications to the uterine cavity undoubtedly will cure chronic purulent endometritis if persisted in for a sufficient time. Applications strong enough to be of service are frequently productive of severe uterine colic, and the risk of introducing other and more virulent infection is so great that the office treatment of chronic endometritis is fully as serious as the disease itself.

Non-gonorrheal chronic purulent endometritis should be treated by curettage. Gonorrheal endometritis is so frequently complicated by salpingitis that treatment of the uterine infection is of minor importance, and if salpingitis is not already present, curetting is more than likely to be followed by its occurrence within two or three days after the operation.

Hemorrhagic Endometritis.—This term is purely clinical and is used to cover certain types of disease of the uterine mucosa which are productive of hemorrhage. At least one of them is

not of infectious or inflammatory origin and micro-organisms are conspicuous by their absence, so that the term "endometritis" is a misnomer, but common usage has so sanctioned it that it seems necessary to retain the word in order not to be misunderstood.

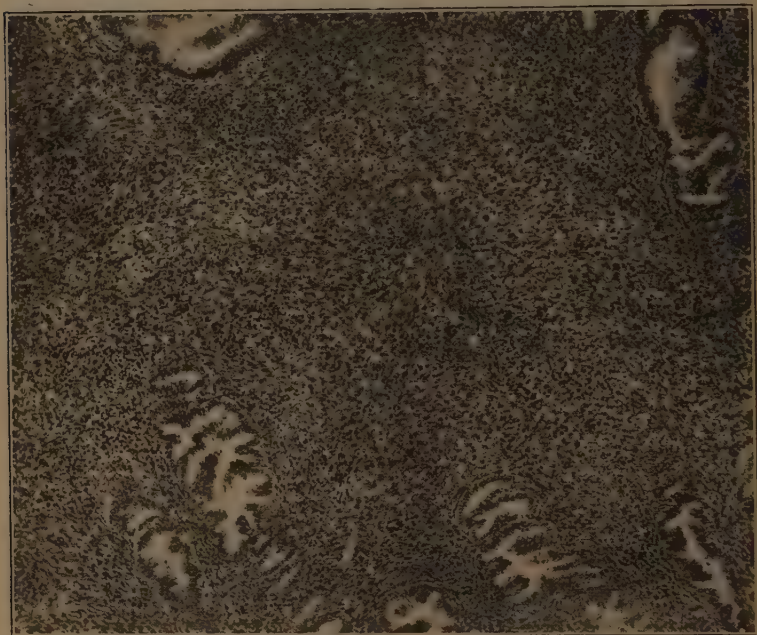


FIG. 102.—Interstitial endometritis. A typical interstitial endometritis with scarcity of glands, but those which are present are unusually convoluted and irregular. The interstitial tissue shows marked proliferation and some cellular infiltration.

Etiology.—Hemorrhagic endometritis may follow an attack of acute endometritis or itself may be acute in the sense that it develops suddenly. It often is associated with and probably is produced by retroversion and retroflexion. It frequently follows an abortion in which there has been no evidence of infection. It is associated with practically all myomata of the uterus which are not distinctly intra-abdominal and pedunculated, and is found in many cases of chronic salpingitis.

Pathology.—Two distinct types are noted microscopically, but both may be present in an individual case. Interstitial endometritis shows marked increase in the interglandular tissue with more or less compression of the glands. This increased tissue is almost entirely composed of small round cells



FIG. 103.—Endometritis—glandular hyperplasia. So-called glandular endometritis. This section shows a somewhat marked glandular hyperplasia of the endometrium, the glands being increased both in number and size. There is no change in the stroma here and no leucocytic infiltration.

and intracellular substance, and when of long standing connective-tissue formation is observed.

Glandular endometritis is marked by great hypertrophy and even hyperplasia of the glands, and for this reason is sometimes termed benign adenoma. The glands may penetrate the muscular structure for a short distance and frequently are tortuous and folded upon themselves. Occasionally one may see more

than a single layer of epithelium lining the glands, but as a rule this picture, which is so characteristic of malignant disease, is not found no matter how marked may be the increase in size and number of the glands. Small cysts may form in long-standing cases in consequence of occlusion of the gland lumen.

Symptoms.—The principal symptom, as the name indicates, is hemorrhage from the uterus, usually in the form of profuse, prolonged menstruation. The periods may also be more frequent than normal so that menstruation is longer than the intermenstrual interval. Pain is generally absent and there may or may not be a severe leucorrheal discharge between the periods. It is surprising in how many instances the only symptoms are hemorrhage and secondary anæmia.

Physical signs may be entirely wanting, the cervix appearing perfectly normal and the uterus unchanged on bi-manual examination, but in most instances the uterus is larger than normal, and it may be either hard or soft according to the extent to which the uterine wall has undergone connective-tissue infiltration.

The differential diagnosis is of great importance as regards both the condition of the endometrium and any underlying cause which may be responsible for the change in the character of the mucosa, since treatment directed to the endometrium alone is likely to be only of temporary benefit unless such cause is removed. It should be remembered that the characteristic symptom, viz., hemorrhage, may be due to extra-pelvic conditions, such as anæmia and chronic heart lesions, without disease of the endometrium.

Salpingitis, ectopic pregnancy, and uterine myomata can be excluded by bi-manual examination, and it finally should be established by a process of exclusion that there is no cause for hemorrhage other than an abnormal condition of the interior of the uterus. Once this is accomplished the possibility of malignant disease, sclerosis of the uterine vessels, and polypi should be taken into consideration, and further diagnosis re-

served until examination of the tissue secured by curettage definitely establishes the pathological process responsible for the hemorrhage.

Polypi are seen in the scrapings; the microscope reveals either a normal or atrophic endometrium in sclerosis; while the microscopic appearance of the endometrium from the various types of endometritis is characteristic.

Treatment.—The last step in diagnosis is curettage and it is also the first step in treatment. Usually nothing more than this is demanded for the endometritis itself, and so-called “local treatment” is useless. Indeed, aside from diagnostic curettage, hemorrhagic endometritis gives the only clear-cut gynæcologic indication for this useful but much abused minor operation.

Displacements must be overcome and myomata or diseased tubes may demand removal. While the diseased endometrium becomes of secondary importance under these circumstances, it nevertheless needs attention unless the primary disease is of such a character that the uterus is removed by the operation made necessary for its correction.

The endometrium which re-forms after curetting is usually healthy but occasionally its regeneration is accompanied by a return of the bleeding. Should this occur the curette must be used again and microscopic evidence of malignancy be sought in all the fragments.

Uterine Polypi.—The term “polypus” is sometimes used to designate sub-mucous myomata which have undergone partial or complete expulsion from the uterus, but this use of the word is confusing.

True uterine polypi are outgrowths from the mucous membrane. They may be considered as a localized endometritis, and their histological structure is similar to that of uterine mucosa which is the subject either of glandular or interstitial endometritis. In the former instance they have been given the name of mucous polypi, in the latter fibrous polypi. They never attain a size larger than a cherry, are pedunculated, and

as they bleed freely and readily escape the curette they are the sources of some very mysterious and worrisome hemorrhage. They rarely undergo malignant degeneration.

When one is discovered it should be removed by torsion of its pedicle and sharp curettage of its base.

Sub-involution.—That process by which the uterus returns to its original condition after abortion or labor is known as involution, and this may be interfered with by infection, retention of parts of the ovum, displacement of the uterus, or failure upon the part of the mother to nurse her child.

The symptoms are prolongation of the lochial discharge and bearing down pain in the pelvis.

On examination the uterus is found to be large, soft, and boggy, and a retroversion, or deeply lacerated or patulous cervix will frequently provide an immediate clue as to the origin of the condition.

Treatment.—Retained fragments of membrane or placental tissue should be removed and displacements rectified, after which prolonged hot douches, the knee-chest posture once or twice daily, and the administration of ergotin and hydrastis internally results in prompt relief.

Hyperinvolution of the uterus after labor is not uncommon and is only an exaggeration of the normal process by which the uterus during lactation becomes smaller than before pregnancy occurred. This extreme reduction in the size of the uterus corrects itself after lactation ceases. Hyperinvolution, therefore, is of no importance in itself, but these small uteri are easily ruptured, and sounding the uterus or dilating the cervix should under no circumstances be performed if hyperinvolution has occurred.

Chronic Metritis.—Certain authorities (Pozzi) insist that inflammation of the endometrium presupposes a corresponding change in the muscular wall of the uterus. Whether or not this is true, it is certain that in many instances such symptoms of endometritis as leucorrhea and prolonged or profuse men-

struation, are followed after many years by diminution of the menstrual flow and the gradual development of menstrual pain.

Examination of patients who give this history reveals a rather large hard uterus which is uniform in shape and presents no fibromatous nodules, and it is reasonable to suppose that its muscular wall has been partially substituted by connective tissue. Occasionally such patients complain of profuse instead of scanty menstruation, which may be attributed to loss of contractile power upon the part of the uterine muscles, and it is probable that this is one of the causes of some otherwise unexplained hemorrhages of the menopause.

Treatment.—Treatment in most instances need be palliative only, as the age at which it occurs is such that normal cessation of menstruation may be expected within a short time. Free purgation and hot douches with occasional scarification of the cervix suffice to keep the patient comfortable until menstruation ceases spontaneously.

Uterine Fibro-myomata.—Uterine fibro-myomata, ordinarily known as fibroids, are probably the most common tumors of the human body. It is said (Hirst) that 20 per cent. of all women have fibroids.

Etiology.—The causative factors in the production of fibroid tumors are wholly unknown. They make their appearance during the active sexual life of the patient, are rare during its early years, become progressively more common during the third and fourth decades, and sometimes disappear spontaneously with the diminished nutrition of the uterus at and after the menopause. Fibroids are relatively more common in colored women and in sterile women of both races.

Pathology.—Primarily fibroids are composed of precisely the same histologic structures as is the uterine wall, and although connective tissue is not lacking in myomatous tumors nor muscle in fibromata, the preponderance of muscle tissue in one tumor and of connective tissue in the other leads to their differentiation as myomata and fibromata respectively.

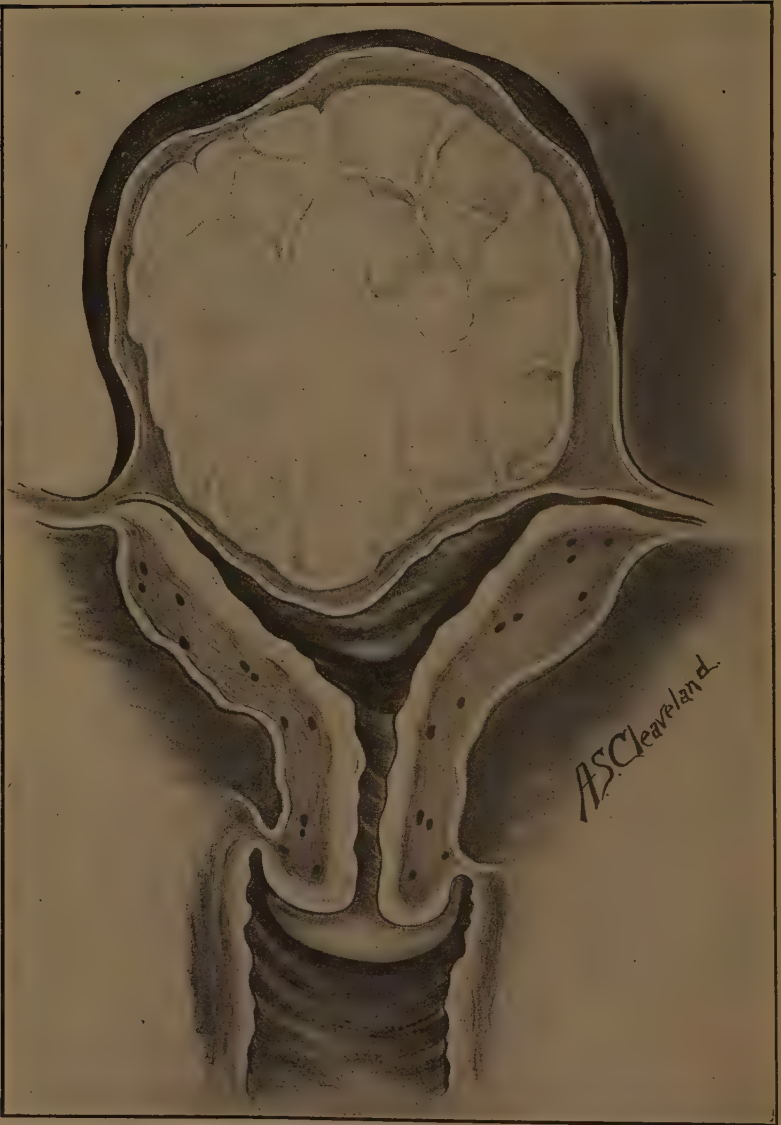


FIG. 104.—Interstitial fibro-myoma growing in fundus and surrounded on all sides by muscle of uterine wall.

The growths may vary in size from the tiniest "seedlings" to huge tumors which almost fill the abdominal cavity. They are enclosed in a dense fibrous capsule into which the nutritive vessels penetrate.

Their starting point is within the substance of the uterine wall (whether from the vessel walls or elsewhere is not definitely

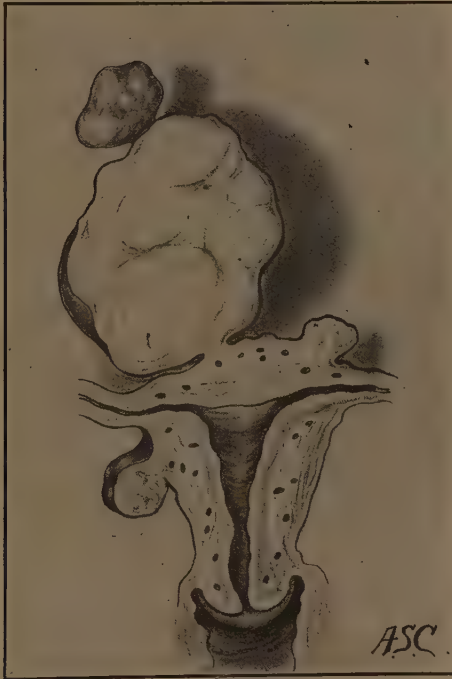


FIG. 105.—Intra-abdominal—so-called subperitoneal fibro-myoma.

determined) and they may remain in the wall of the uterus surrounded on all sides by its muscular tissue; they may grow toward and finally into the uterine cavity, thus being covered externally only by muscle; or outward into the peritoneal cavity, having their inner boundary only made up of the uterine muscle.

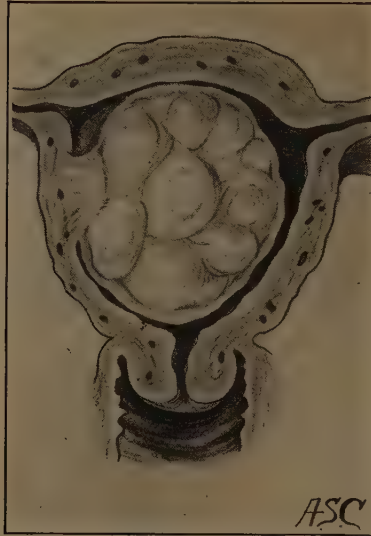


FIG. 106.—Intra-uterine or submucous fibro-myoma.



FIG. 107.—Intramural or interstitial fibro-myoma.

According to the final location of the tumor it is given a distinctive name.

Those remaining in the uterine wall are known as intramural or interstitial, those in the uterine cavity as sub-mucous or intra-uterine, and those projecting largely into the abdominal



FIG. 108.—Intraligamentary fibro-myoma, which also is properly termed subserous.

cavity as intra-abdominal or sub-peritoneal. Owing to the latter name being applied also to such tumors as grow definitely under the parietal peritoneum or between the folds of the broad ligament, those which project distinctly into the abdominal cavity will, for the sake of clearness, be termed intra-abdominal instead of sub-serous or sub-peritoneal. The latter terms should

be used to define those growths which follow the floor of the pelvic cavity and elevate the parietal peritoneum over them.

A tumor which happens to be so situated as to grow from the lateral wall of the uterus at such a point as to force itself between the folds of the broad ligament is known as an intra-ligamentary fibroid.



FIG. 109.—Leiomyofibroma of the uterus. This microphotograph shows the whorls of non-striated muscle which make up the bulk of the tumor.

The uterine fibroid may be sessile, as are all intramural growths, or pedunculated, as are many intra-uterine and some of the intra-abdominal.

They are seldom solitary and almost invariably are found in groups, many times superimposed one upon the other.

The microscopic picture of uncomplicated fibro-myoma is simple and reveals whorls of muscle fiber interspersed with

greater or less amounts of connective tissue, the whole being arranged concentrically. Blood-vessels and lymphatics are everywhere present, but nerves have so far not been demonstrated.

Various forms of degeneration are met with. In calcareous

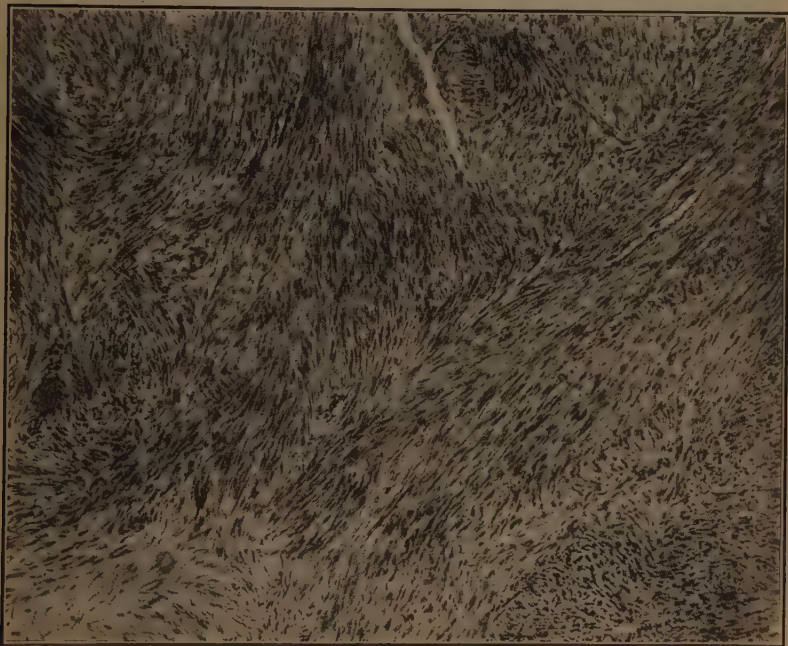


FIG. 110.—Leiomyosarcoma of the uterus. Sarcomatous degeneration of a leiomyofibroma. The nuclear elements are relatively much increased; many of them are atypical in size, shape, or staining power. As contrasted with the nonsarcomatous leiomyofibroma the chief difference is in its greater cellularity. It still shows the whorls of cells characteristic of the leiomyofibroma but the nuclei are so much increased that the neoplasm is definitely malignant and capable of setting up metastases.

degeneration the deposit of carbonate and phosphate of lime renders the growth very hard and produces the so-called "stone tumor." Myxomatous degeneration is recognized by some authorities while others contend that such processes are really sarcomatous.

Sarcomata may originate in the growth, and carcinomata in the endometrium covering its intra-uterine surface. Necrotic processes are fairly common and are the result either of infection or of mechanical interference with the circulation.

Hyperplastic endometritis is an invariable accompaniment of intra-uterine myomata, is frequently present in intramural growths, and occasionally is associated with intra-abdominal tumors.

Symptoms and Physical Signs.—The only symptoms *due directly* to an uncomplicated fibroid are those produced by the size and location of the growth. An intra-abdominal fibroid of moderate size may exist without symptoms and be discovered only by accident. Large intra-abdominal growths are productive of symptoms from pressure upon the viscera. In this way irritability of the bladder, obstinate constipation, and hydronephrosis may be caused respectively by pressure on the bladder, pressure on the rectum, or pinching of the ureter between the tumor and the wall of the bony pelvis.

Intra-uterine tumors, by acting as foreign bodies, may stimulate expulsive efforts on the part of the uterus and thus cause labor-like pains.

Sub-peritoneal tumors grow principally in the pelvic cavity and are productive of earlier pressure symptoms than the other varieties on account of their proximity to the fixed bony walls.

Hemorrhage, either menorrhagic or metrorrhagic in type, is a common result of intra-uterine and intramural tumors, and is brought about by the hyperplastic endometritis which always accompanies the former and usually the latter, together with the increased size of the uterus which adds greatly to the area of the endometrium. These hemorrhages may amount to but little more than a trivial increase in the duration or quantity of the menstrual flow, or they may be so severe as actually to jeopardize life. In the average case they are serious enough to produce a moderate grade of anæmia, as the patient hardly recovers from one menstrual flow before the succeeding one

begins. Shortness of breath, palpitation of the heart, and languor are then present in proportion to the degree of anæmia which exists. A moderate serous leucorrhœa may occur either before or after each menstrual period.

Sterility is the rule in patients having intra-uterine or interstitial fibroids. Pregnancy however may occur, in which event the tumor grows more rapidly than before, and should the pregnancy continue until term and the patient be delivered without serious accident, involution of the tumor, but not its disappearance can be expected.

Physical Signs.—Tumors arising above the pelvic inlet produce abdominal enlargement in proportion to their size. On palpation they are generally firm, nodular, and irregular in outline, although in the presence of œdema or immediately preceding menstruation more or less elasticity is evident. Occasionally but a single fibroid is present and this may be smooth and regular in outline.

The tumor may be situated at either side of or in the median line, and its lower border cannot be defined by abdominal palpation because of its pelvic origin. Flatness on percussion is always present if the growth is sufficiently large to come into contact with the anterior abdominal wall. On auscultation a bruit synchronous with the radial pulse may very rarely be heard.

Inspection of the vulva usually reveals no discoloration even with an impacted tumor.

On digital examination the cervix is hard and the tumor is found to be directly connected with it. Above the cervix the outlines of the growth are perceptible and nodules are generally palpable. On bi-manual examination, motion conveyed to the tumor by one hand is transmitted directly to that portion of the tumor palpated by the other. The sound, when used, shows the uterine cavity to be greatly elongated and often irregular in shape.

Differential Diagnosis.—In the differential diagnosis of

uterine fibroids the fact to be ascertained is whether the bleeding, abdominal enlargement, and pressure symptoms because of which the patient presents herself, are due to a new growth, and if so whether the growth is a uterine fibroid.

Pregnancy, either normal or abnormal, is at one time or another the most serious stumbling block. Typical pregnancy causes cessation of menstruation; typically, fibroids increase the frequency and amount of blood lost, but in pregnancy menstruation may continue for the first three or four months until the deciduæ permanently fuse; central placenta previa may produce intermittent hemorrhage until pregnancy terminates; normal pregnancy with threatened abortion produces irregular hemorrhage; ectopic pregnancy rarely fails to have irregular bleeding as one of its symptoms; and the various types of mole and deciduomamalignum, which may be considered as sequelæ of pregnancy, all cause some bleeding and are associated with enlargement of the uterus.

On the other hand, a fibroid which is distinctly intra-abdominal may not disturb the menstrual functions at any time, and after the menopause may grow rapidly without producing hemorrhage. Therefore, symptom hemorrhage, alone, must not be considered as diagnostic of a fibroid tumor, and this subjective symptom needs the confirmatory evidence of the physical signs characteristic of a fibroid before the diagnosis can be considered as established.

Abdominal enlargement in women is most frequently caused by pregnancy, by fibroids, by ovarian tumors, and ascites, in the order named, but tuberculous peritonitis, carcinoma of the abdominal viscera, rapid deposit of fat in the abdominal wall, and the hysterical phantom tumor need always to be considered.

In reverse order, the phantom tumor is tympanitic on percussion and disappears under anæsthesia; a fat abdominal wall may be picked up bodily; carcinoma, while nodular, is palpable over various and widely separated portions of the abdomen;

and tuberculous peritonitis presents some elevation of temperature, some pain, isolated areas of dullness, a quick pulse and loss of weight.

Ascites produces uniform enlargement. Ascitic fluid sinks to the lowest portion of the abdomen and thus the dullness shifts as the patient is turned from side to side, sits up, or lies down.

Further, none of these conditions excepting carcinoma and tuberculous peritonitis develop in, and extend upward out of, the pelvic cavity.

It is usually stated that ovarian tumors are elastic, fibroids hard; that ovarian tumors spring from one side rather than the mid-line and are regular in outline, while fibroids are irregular or nodular. While the foregoing is true in most instances, some ovarian tumors nevertheless are hard, and œdematous fibroids are elastic; rapidly growing multilocular ovarian cysts may be irregular, and large intra-uterine fibroids are regularly globular in shape while some fibroids are pedunculated and lateral, so that *unless the uterus can be distinctly outlined* as an organ separate from the growth, the differential diagnosis between an ovarian tumor and a uterine fibroid may be impossible.

The abdominal enlargement of pregnancy is of rapid growth, and if amenorrhea is present *the uterus should correspond in size to its duration*. Fibroids are of slow growth. The pregnant uterus contracts under the hand while such contraction takes place with fibroids only if the growth is intra-uterine. A uterine bruit may be present in both conditions but far more frequently in pregnancy. If the tumor is larger than a four months' pregnancy the foetus can be detected in some fashion if the patient is pregnant, either by foetal heart sounds, foetal motion, or palpation of foetal parts. The cervix is softened in pregnancy, hard in fibroids; and finally *time* can be depended on to complete the differential diagnosis if the symptoms are not so urgent as to demand early interference.

The student always has to bear in mind the tremendous probability of pregnancy during the child-bearing age, and the

relative infrequency of fibroids, and further that fibroids and pregnancy may co-exist.

Prognosis.—The prognosis of untreated fibro-myomata is to a great extent dependent upon the presence or possibility of complications rather than the existence of a tumor.

Very large tumors jeopardize life. Intra-uterine tumors readily become infected and undergo necrosis. Hemorrhage by itself is rarely fatal, but profound anæmia exercises a deleterious effect upon the heart and renders the patient a fit subject for intercurrent disease. Inflammatory disease of the tubes is a frequent concomitant, and sarcomatous degeneration is found entirely too often to be a coincidence as also is malignant disease of the cervix.

The occurrence of pregnancy is distinctly a serious matter, and labor may be interfered with by the presence of a fibroid in the lower uterine segment. Abortion is more likely to occur than it is with a normal uterus, and both abortion and full-term labor are more likely to be followed by infection. Bruising of a tumor in the lower uterine segment may cause necrosis and so lower its resistance to infection, and abnormal implantation or retention of the placenta lead to obstetric complications.

Altogether one might say that the prognosis in an individual case may be very good, while in a large series of cases enough complications are certain to be found to jeopardize an occasional life, and render many others hardly worth living.

The menopause may put a stop to some of the annoyances but cannot be depended upon to end all the complications.

Treatment.—There is no medical treatment for the tumor itself. Ergot and hydrastis assist in controlling the hemorrhage, and ergot may cause the eventual expulsion of an intra-uterine tumor, but only after much pain, hemorrhage, and danger from necrosis and infection. Rest in bed during the hemorrhage will diminish the amount of blood lost, and large doses of iron between the periods help to overcome anæmia. Strychnine, digitalis, good food and fresh air, all assist in remedying

the results of the bleeding, but they have no effect on the tumor.

Galvanic electricity with the positive pole in the uterus diminishes the bleeding, but every individual treatment is fraught with the risk of infection, while the necessary repetition of the treatment makes the method on the whole more dangerous than operation, and it fails to rid the patient of her tumor.

Curettage, to temporarily check the hemorrhage, is sometimes judicious when the bleeding comes from a hyperplastic endometrium and not from the surface of an intra-uterine growth.

Recently the use of the X-ray and radium have come into vogue in some quarters for the cure of uterine fibroids. That these tumors often diminish in size under the use of massive dosage with special appliances is quite certain—that they are entirely destroyed is improbable—and it remains to be seen whether a tumor which has been shrunk by the X-ray treatment loses its predilection for sarcomatous degeneration, or whether a uterus which contains a fibroid does not continue to menace life by possible carcinomatous changes in the endometrium. With our present knowledge radio-therapy should be reserved for the treatment of patients who refuse operation or in whom operation is for any reason injudicious or extra-hazardous.

Surgical Treatment.—The indications for the surgical removal of fibroid tumors are based upon the ordinary rules of surgery. When the disease is more dangerous than the operation required for its removal, operation should be advised. When the risk of operation is to be preferred to the discomfort engendered by the disease, operation should be advised. Based upon these considerations, only a very small symptomless fibroid which has been discovered in the course of the routine examination of a middle-aged woman, should be ignored.

All intra-uterine growths should be removed as should tumors which are productive of pressure symptoms either from their size or location. All fibroids which cause free bleeding, grow rapidly, or are painful, should be subjected to radical operation.

The term "large growths" is a relative one, and a small tumor in a young woman is a greater menace to life and health than a much larger one at or near the menopause, because of the greater probability of some positive need for operation arising in the former than in the latter, and also because it has a longer period of time in which to grow.

Some few tumors may be watched carefully to ascertain whether or not they are growing, but in a general way *all symptom-producing* fibroids should be removed. The mortality rate from hysterectomy actually is smaller than that from malignant degeneration of fibroids or the incidence of malignancy in the uterus which contains them. They ought therefore to be removed even if possible malignancy were the only indication, instead of which it is but one of many indications.

In a recent series of the author's, out of 100 patients upon whom hysterectomy was proposed for the removal of fibroids, one proved to be inoperable because of gross sarcomatous degeneration, another was sarcomatous on microscopic examination and recurred, and two uteri contained carcinomata which recurred after operation. A high grade of anæmia, gross heart lesions with decompensation, and advanced nephritis, here as elsewhere are distinct contra-indications to the performance of a radical operation.

Choice of Methods.—Myomectomy, vaginal or abdominal, and hysterectomy, vaginal or abdominal, are the methods at our command for the removal of fibroid tumors of the uterus.

The vaginal removal of small, single, pedunculated, intra-uterine myomata meets with the approval of all. Large tumors situated within the uterus may also be removed in the same manner, but the risks are as great as from abdominal section and hysterectomy, and when one considers the possibility of more than one tumor being present the latter method is preferable.

Vaginal hysterectomy may be performed for tumors up to the size of a small foetal head, but the vagina must be capacious and

the ligaments so relaxed that the uterus can be well drawn down if the operation is to be as safe as abdominal hysterectomy, and salpingitis or other adhesion-producing complications should be absent.

Abdominal myomectomy is especially applicable to pedunculated intra-abdominal growths, and should be used for sessile growths only if their number is small and the patient so young that child-bearing ought not to be interfered with.

Supra-vaginal hysterectomy is applicable to the great majority of fibroids which need removal. It allows one to deal with complications most satisfactorily, has a very low mortality rate, and does not necessitate removal of the ovaries. Panhysterectomy should be done if the tumor, uterine body, or cervix gives ground for any suspicion of malignancy.

The choice of methods will also depend somewhat upon the operator's training. A skilled vaginal surgeon can overcome difficulties through the lower route which would prove insurmountable for the average operator.

The great advantage of the vaginal route lies in the absence of operative shock, Nature having accustomed the lower pelvis and vagina to withstand trauma through the world old process of child bearing, but the disadvantages of this route, in any but the simplest cases, are tremendous for the average operator.

MALIGNANT DISEASE OF THE UTERINE BODY

Three forms of malignant disease are found in the body of the uterus: carcinoma, sarcoma, and deciduoma malignum. They are not grouped together because of any relationship, but because their comparatively infrequent occurrence, aside from the presence of the first two as complicating factors in pre-existing fibroids, does not justify the devotion of a separate section to each of them.

Cancer of the uterine body is much less frequently found than cancer of the cervix, and unlike the latter is as common in nulli-

paræ as in multiparæ. It grows more slowly than cervical carcinoma and metastases are relatively late in occurring.

The usual symptoms are irregular bleeding at or after the menopause, alternating with a foul-smelling watery or bloody discharge. On bi-manual examination no change can be made

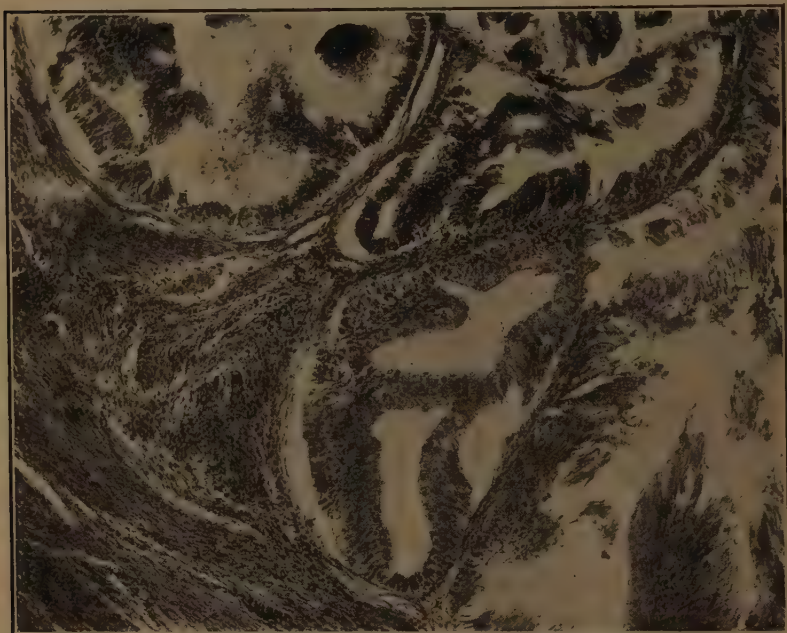


FIG. III.—Adenocarcinoma originating in the endometrium. Here deeply infiltrating the uterine wall. The section shows a ground work of uterine muscle which is seen at the lower left corner of the field and which is somewhat infiltrated with leucocytes. The remaining portions of the plate are filled with very atypical gland-like spaces having an epithelium unlike that normally found in the uterus made up of very tall columnar cells showing some tendency to stratification. These atypical gland-like spaces are infiltrating the muscle.

out early in the disease, but as it progresses the uterus becomes larger, and eventually the entire pelvis may be choked by masses of cancerous tissue. The diagnosis is never positive in the early stages excepting upon the microscopic examination of specimens removed by exploratory curettage, and irregular bleeding at or

beyond the menopause is by all means the most frequent indication for curettage for diagnostic purposes.

The treatment of carcinoma of the body of the uterus is panhysterectomy in all cases which are diagnosed before metastases or extension to surrounding organs has taken place, and

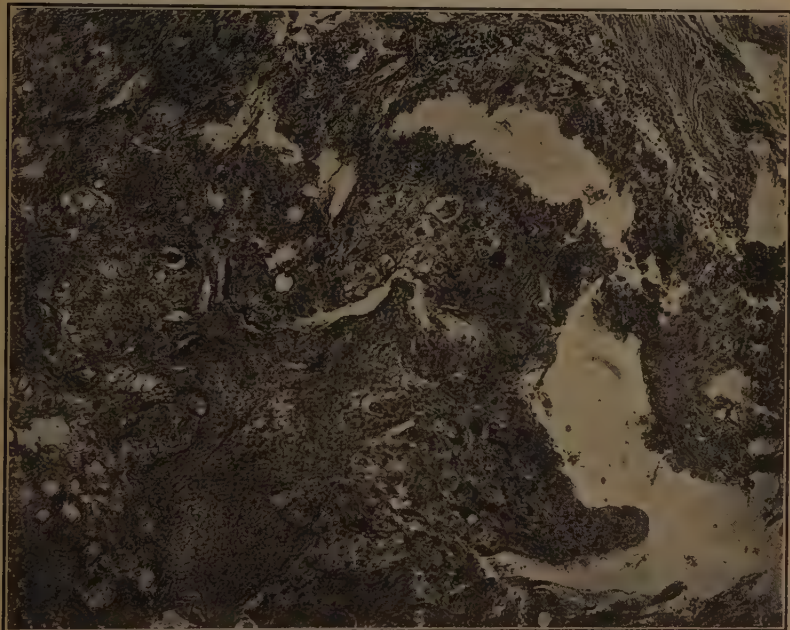


FIG. 112.—Syncytioma Malignum. Chorio-epithelioma. In this section the uninvaded uterine muscle is seen at the upper right. Between this and the mass of blood clot in the lower left there are irregular masses of characteristic cells of this tumor. The syncytial cells have irregular darkly staining nuclear masses and are not as numerous as are the derivatives of the Langhan's layer. The latter can be differentiated by their regular shape and definite cell outlines.

the prognosis as to recurrence is materially better than after radical operation for cancer of the cervix.

When metastases or regional extension has taken place no operation is of the slightest avail, and radiotherapy with massive dosage should be tried as a last resort.

Primary sarcoma of the uterus is a rare disease, but as a

secondary affection it may occur in patients who have fibroids, and also by metastasis from sarcoma in other portions of the body. Its symptoms are the same as those of carcinoma, and previous to operation it can be differentiated from it by microscopic examination only. The treatment also is the same, radical removal if the disease is confined to the uterus, radium and X-ray therapy if extension or metastases render the condition hopeless from an operative standpoint.

In one instance under the author's care which both macroscopically and microscopically was sarcomatous, Coley's toxins seemed to cause a diminution in the size of the growth with entire abatement of the symptoms.

Deciduoma malignum, more correctly chorio-epithelioma, is due to the taking on of malignant characteristics by the large flat epithelial cells which normally cover the chorionic villi. It therefore occurs only after the termination of pregnancy by abortion, full term labor, or the evacuation of a mole. A hydatidiform mole is the most frequent immediate antecedent of this form of malignant disease, which reveals itself by the appearance of hemorrhage and rapid growth of the uterus at a stage when it should be subsiding in size. Diagnosis is readily made microscopically, and treatment is by extirpation of the uterus if the patient is seen sufficiently early. In some respects, however, this is the most malignant type of malignant disease, showing rapid growth and early metastases, especially to the bones, and operation must be done at the earliest possible moment if it is to be of any avail.

One cannot close a section upon diseases of the uterus without remarking that malignant disease is the opprobrium of surgery, that malignant disease of the uterus is the especial opprobrium of the specialist in abdominal and pelvic surgery, and that in spite of the wide dissemination of knowledge concerning cancer, neither the laity nor general practitioners of medicine are sufficiently alert to the early symptoms of malignancy and the absolute necessity for its early diagnosis.

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CHAPTER IX

DISPLACEMENTS OF THE UTERUS

Normally the uterus is situated nearly in the mid-line of the body, deviating a trifle to the right or left when the bladder is full. The fundus rests upon the bladder, and when that viscus is empty the fundus and posterior wall of the body may be palpated immediately behind the symphysis pubis on bi-manual examination. The long axis of the uterus meets the vagina very nearly at a right angle, while the cervix lies posterior to but in a line approximately paralleling the pelvic axis, the junction of the body and cervix being about 3 cm. in front of the sacrum. The normal position of the uterus therefore is one of anteversion and moderate anteflexion. The forces which maintain the uterus in this location and position are its attachments to surrounding structures acting with the assistance of intra-abdominal pressure. The sacro-uterine ligaments maintain the junction of the body and cervix at a given level by their tonicity, and are assisted by a collar of connective tissue which entirely surrounds the supra-vaginal portion of the cervix. This parametritic tissue extends laterally between the folds of the broad ligaments to the pelvic wall on either side. Anteriorly the vesico-vaginal septum takes a portion of the weight of the uterus, and in addition the cervix rests upon the posterior vaginal wall when that canal is not distended. As the location of the uterus as a whole is maintained by the foregoing factors, so its position or attitude is determined by the points to which the surrounding structures are attached and the direction in which intra-abdominal pressure tends to drive it. Even the location is somewhat dependent upon its position, as for example, it is impossible

for the uterus to descend through the vaginal canal so long as it remains at a right angle to it, and it must assume such a position that its long axis points in the same general direction as the long axis of the vagina.

It has been pointed out that the vicinity of the internal uterine orifice is the most nearly fixed of any portion of the uterus, and it is about this point that the uterus deviates in malpositions.

The round ligaments serve as slender guy ropes to draw the fundus forward, rotating the uterus about a transverse line drawn through its internal orifice, and they are not opposed in their action by any similar structures attached posteriorly. The mechanical effect of intra-abdominal pressure resembles very closely the conditions which would be present if the abdominal cavity were filled with water. The uterus being of low specific gravity, its fundus and body above the line of peritoneal attachment are readily displaced, and for the same reason they are also readily replaced by such trifling force as the round ligaments are able to exert. So long as the fundus remains tilted forward, the hydrostatic pressure of the abdominal contents is exerted on its posterior face and assists in keeping it forward. When the fundus is displaced backward to a sufficient extent to bring this pressure to bear on its anterior surface, the natural mechanical tendency is to keep it back, but in a condition of health the round ligaments more than counterbalance this and again draw the fundus into its normal position.

Primarily, then, the uterus is not a fixed organ but possesses a wide range of mobility; neither is it rigid, for it possesses a moderate degree of flexibility. It may be displaced or bent upon itself but under normal conditions tends to return to a fairly definite location and position in the pelvis as soon as the displacing force ceases to act, and only when it fails to return to this location and position can pathological displacement be said to exist.

CLASSIFICATION OF DISPLACEMENTS

Departures of the uterus from its ordinary situation are defined either as mal-locations or mal-positions. Mal-location is a departure of the entire uterus from its usual relations. Mal-position is such a deviation from its ordinary attitude that the long axis of the uterus has changed its direction.

The mal-locations are ascent, descent, more commonly known as prolapse, antelocation, retrolocation, and right and

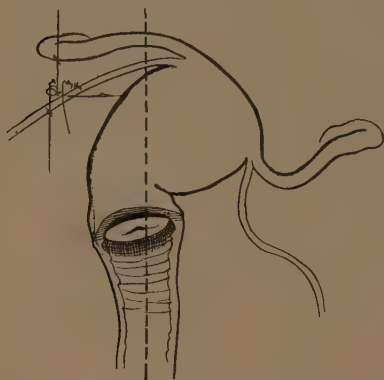


FIG. 113.—Lateral flexion of uterus.

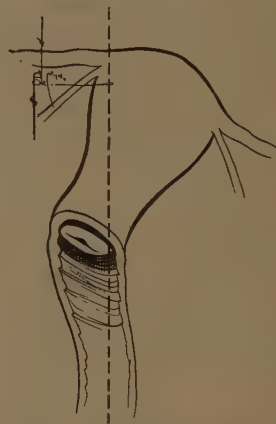


FIG. 114.—Lateral version of uterus.

left lateral locations, all of which are sufficiently designated and defined by their names.

In mal-position the long axis of the uterus may be either a straight or curved line; when the former, a version is present, when the latter, a flexion.

The mal-positions are anteversion, anteflexion, retroversion, retroflexion, left-lateral version, left-lateral flexion, right-lateral version, and right-lateral flexion.

Both of the lateral mal-locations as well as lateral version and lateral flexion are relatively of little importance, and the same is true of anteversion; while descent, anteflexion, retro-

version, and retroflexion are common and frequently demand attention.

In any of the displacements the uterus may be movable or fixed, fixation being brought about most commonly by adhesions to neighboring structures, but occasionally by tumor pressure or the accumulation of blood, pus, etc., in the neighborhood; and this distinction between movable and fixed displacement is of great importance from the standpoint of treatment.

Mal-locations.—Ascent is produced either by traction upon the uterus from above or upward pressure from below. Tumors growing from, or adherent to, the uterus may by their growth drag the organ with them into the abdominal cavity, and tumors which grow from the cervix and develop low in the pelvis may push it upward, as may such an accumulation of fluid beneath it as is present in pelvic abscess, hemocele, and hematocolpos. The symptoms presented are those of the disease which produces the displacement, the latter itself producing no disturbance, and the vital point is the diagnosis of the pathological condition which is producing the displacement. Ascent ordinarily is recognized by the absence of the uterus from its usual location, and the presence of a body conforming to the general outlines of the uterus higher in the pelvis or even in the abdominal cavity. In the treatment of ascent the object sought is the removal of the cause, whether this be a tumor, pelvic abscess, hemocele, or hematocolpos, while the treatment of the displacement is but a secondary incident.

Posterior and lateral dislocations are most commonly secondary considerations also, and are produced by tumors or collections of fluid which crowd the uterus *away* from that portion of the pelvis which they occupy, or by adhesions and cicatrices which draw the uterus toward that quadrant of the pelvis in which they are formed. An abnormal anterior location is sometimes brought about by relaxation of the sacro-uterine muscles when this is associated with puerperal injuries to the vesico-vaginal septum, thus allowing the whole uterus to drop, but this

condition does not demand separate consideration. In fact all malpositions except descent are secondary both in their etiology and treatment to the causative lesion, and the recognition of this causative lesion is the really important problem.

DESCENT OR PROLAPSUS UTERI

Prolapsus uteri is usually divided into three degrees. The first degree includes descent which varies from a merely recognizable degree to that in which the cervix lies just within the vulva. The second degree implies the appearance of the cervix at the vulva, while the third includes all instances in which the uterus either partially or completely escapes from the vulva. This arrangement of the degrees of descent is not exact but it has the merit of convenience.

The usual causes are injuries produced by child-birth. Injuries to the levator ani muscles and their fasciæ allow the posterior segment of the anatomical perineum to drop away from the anterior, and thus bring the long axis of the vagina more nearly parallel to that of the uterus. Injuries to the anterior segment of the perineum allow the bladder to prolapse and draw the lower pole of the uterus forward, so that the long axis of the uterus is more nearly parallel to that of the vagina. Lifting, straining, standing, or walking too soon after labor and before the uterine supports have returned to their normal condition, brings pressure to bear upon the uterus and tends to drive it downward. Many old women who boast that they always resumed their housework two or three days after labor are unaware of the fact that their protruding uteri are the direct result of such hardihood. In the majority of instances injury to the levator and its fascia posteriorly, and the vesico-vaginal septum anteriorly, allows the bladder to protrude and draw the cervix with it, so that the formation of a cystocele is in these cases the first step in the production of uterine prolapse.

Any of the causes, which are primarily associated with injuries

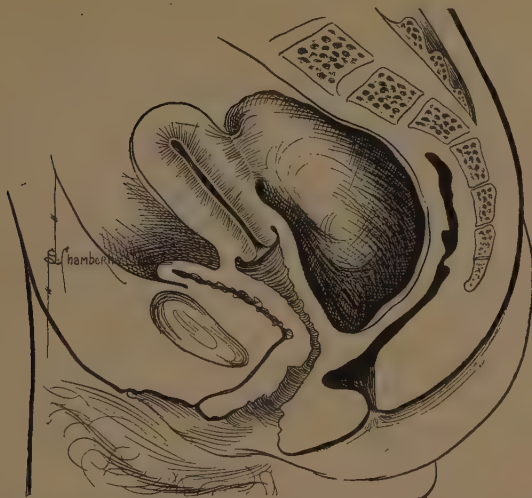


FIG. 115.—Ascent of uterus due to fibroid growing from posterior uterine wall which carries uterus with it. On bimanual examination this might be mistaken for a retroflexion with a tumor in the anterior uterine wall.



FIG. 116.—Descent or prolapsus uteri. "Second degree."

during parturition, are followed by more evidence of disability after the menopause, because at this time physiological atrophy of the muscles of the pelvic diaphragm and perineum begins, and this process eventually removes the last remnant of support which the pelvic contents may have had.

Lastly we must recognize that there are a limited number of cases of prolapse occurring in nulliparous women, and that they may reach an extreme degree. These cases are always accompanied by congenital retroversion or retroflexion and could not occur without it.

Prolapse is always chronic in type even though it may seem to occur suddenly. In these instances a moderate degree of unrecognized prolapse was previously present, and the acute symptoms are due to a sudden increase in the degree of descent.

Symptoms.—As retroversion is necessarily accompanied by some prolapse, and as prolapse beyond a barely perceptible degree also presupposes posterior displacement, it frequently is difficult in a given case to determine whether the prolapse is causing the patient's symptoms, or whether they are the result of the associated posterior displacement.

Actual pain is a more frequent symptom of the early than of the advanced cases. It is likely that in early cases pain is caused by traction upon the sensory nerves contained in the supporting structures and to incarceration of the uterus in the hollow of the sacrum, and that later, as the prolapse becomes more complete, the nerves are over-stretched and the uterus sinks to such a level that it is not compressed, so that pain becomes a less marked feature. In extreme prolapse there may be no pain whatever, and the patient may seek relief only because a mass protrudes from the vulva and acts as a mechanical nuisance. Dragging in the hypogastric regions, sacral back-ache, and a feeling of weakness in the entire lower abdomen are usually complained of, while the actual association of cystocele with prolapse leads to incomplete evacuation of the bladder.

Decomposition of urine and actual cystitis are not so common

as one might suppose, but bladder irritability and incomplete relief at each act of urination are frequent.

Upon examination the uterus is found in that location which corresponds to the degree of prolapse present. In the lesser degrees, which are merely concomitants of retroversion or retroflexion, the prolapse is likely to be unrecognized unless the patient is examined while standing, and even complete procidentia might sometimes be overlooked if the patient did not insist that "something came out." If the uterus protrudes constantly, the vaginal walls become dry and parchment-like, and the odor of decomposing urine lingers about the parts in spite of the utmost care on the part of the patient. Contact with the thighs, with the clothing, with street dust, and the irritation of decomposing urine on the protruding cervix and vaginal wall may lead to superficial erosion and occasionally to deep ulceration.

It is hardly possible to mistake prolapse for any other condition once the external uterine orifice is detected at the apex of the protruding mass, but the cystocele which usually antedates it is often mistaken by the laity for a prolapse of the uterus itself. Strangulation of the prolapsed uterus is a rare and very dangerous complication which may be confounded with chronic inversion, but here again the location of the external orifice enables one to differentiate between the two. Rarely, hypertrophic elongation of the cervix may be mistaken for prolapse, but in the former the fundus is in its usual location while in the latter it is absent therefrom. Replacement of the uterus and bi-manual examination is always necessary, both to ascertain the size of the uterus and exclude other pelvic complications.

Treatment.—The treatment of descent may be either mechanical or operative. In the mechanical treatment the object sought is the retention of the uterus, together with any viscera which may prolapse with it, at or near their proper level in the pelvis.

In mild cases this object is attained by mechanical supports

which retain the uterus in its normal position of anteversion, and in such cases the treatment resolves itself practically into the treatment of retroversion and retroflexion by means of pessaries. In severe degrees of prolapse additional support is necessary in order to supply the deficiency created by the absence of a normal pelvic diaphragm. In such types, represented by prolapse of the second and third degree, mechanical treatment is unsatisfactory and uncleanly, but it frequently must be resorted to in very old and feeble patients and in those who refuse operation. Pessaries of the Smith-Hodge and ring patterns sometimes hold the uterus in place, but more often they fail to retain it within the body because the relaxed vaginal orifice permits their ready expulsion upon exertion, and in this event it becomes necessary to adjust either a ball or cup pessary. Ball pessaries must be so large that they cannot be readily expelled as they depend wholly upon their size for their efficiency.

The soft rubber ball is more satisfactory than the hard so far as its retentive power is concerned, but it also retains the uterine and vaginal discharge and unless frequently removed and cleansed sets up an offensive vaginitis.

The cup pessary has a vaginal stem and is retained in place by means of perineal straps and an abdominal belt to which the straps are attached, and it likewise must be removed daily for cleansing. Any appliance which depends for its usefulness upon direct pressure against the prolapsing viscera, as do the ball and cup pessaries, must be used with great care as ulceration of the surface with which it is in contact is likely to ensue.

Other things being equal, operative measures are to be preferred to mechanical, but in women of such advanced age that their lease upon life is short at best, or whose health is so bad that operation is likely to be dangerous, mechanical means of retention become a necessary evil.

Operative procedures are satisfactory in young and middle-aged married women in proportion to the extent to which they

conform to the idea that prolapse of the uterus is a hernia of the uterus through the pelvic diaphragm. In old women whose sexual organs no longer are functionally active the problem of retention of the uterus is easy; but all operations fail if they are performed with the sole object of removing the protruding mass, because the hernial orifice permits the passage of other viscera so soon as the uterus is out of the way. The problem is more complicated than in inguinal hernia, in which intra-abdominal pressure serves to keep the canal closed if the sac is removed and the canal restored to its original oblique position. In prolapse, not only must the canal be restored but the uterus must be returned to such a position that it cannot be made to protrude by intra-abdominal pressure, and, if this is not possible, increased resistance must be supplied by anchoring it to the anterior abdominal wall above. A combination of operations is usually necessary in order to carry out the foregoing indications and overcome the prolapse.

Before the menopause the cervix is frequently found to be lacerated and hypertrophied, and its amputation is demanded as the first step. Next the cystocele should be corrected by some method which does not shorten the anterior vaginal wall, and this is best accomplished by method No. 2, together with Emmett's denudation which tends to throw the cervix toward the hollow of the sacrum; then the posterior segment of the perineum is restored to its normal position under the pubic arch by method No. 1, No. 2, or No. 3 of perineorrhaphy. This may be all that is necessary in mild cases. Ordinarily, however, one of the methods of shortening the round ligaments must be added to the above in order to maintain the fundus in its normal forward position of anteversion.

In long-standing cases, in which the muscles of the pelvic diaphragm have undergone atrophy from disuse, fixation of the uterus to the anterior abdominal wall or to the anterior vaginal wall becomes necessary in addition to the plastic operation. Vaginal fixation is advocated by some authorities, but abdominal

fixation is simpler for the occasional operator, and opening the peritoneal cavity from the vagina is no safer as regards infection than is opening it through the anterior abdominal wall. Neither shortening the round ligaments, nor ventro-suspension, are sufficient in marked prolapse because the normal ligaments are too weak to do more than hold the fundus forward, and the third ligament which is formed by the suspension operation

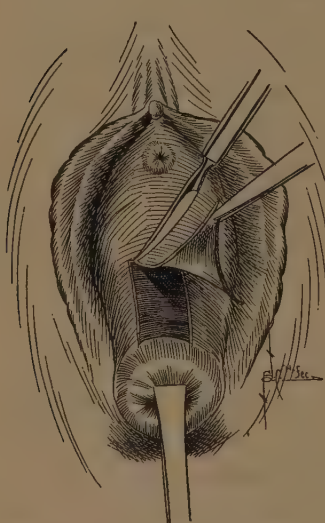


FIG. 117.—The LeFort operation.
Anterior denudation.

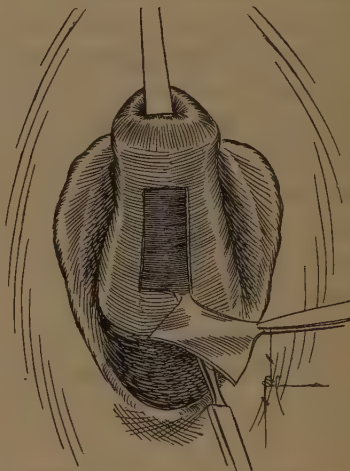


FIG. 118.—The LeFort operation.
Posterior denudation.

eventually draws out to a filamentous band or thread which possesses the same defect. Fixation, as distinguished from suspension, overcomes this defect, but fixation never should be performed upon women who are subject to the possibility of pregnancy, as serious difficulty during gestation or at the time of labor could scarcely be avoided.

This combination of operations: amputation of the cervix, anterior colporrhaphy, perineorrhaphy, and ventro-fixation, is especially applicable to that class of cases for which vaginal

hysterectomy is usually advised, and it has the advantage over the latter operation that it does not deprive the patient of any of her genital organs. In women who are past the menopause this may not be a vital consideration, but even in such patients the anteverted fixed uterus assists in preventing hernial protrusion of other pelvic viscera. During active sexual life fixation should not be performed unless the condition is so extreme as to justify sterilization by resection of the tubes, a procedure which is less grave than sterilization by removal of the uterus.

For women whose age or domestic status is such that the functions of the vagina as a copulative organ are not important, a much simpler operative combination may be selected, and the vagina can be narrowed by the LeFort operation to such an extent and in such a fashion that protrusion of the uterus through it is impossible. If the cervix is hypertrophied it should first be amputated, then the anterior and posterior vaginal walls are denuded by removal of a longitudinal strip 3 cm. wide, extending

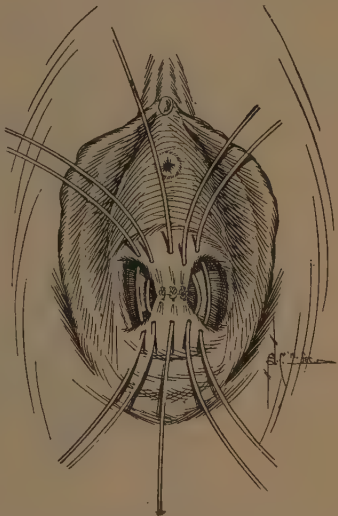


FIG. 119.—The LeFort operation. Placing sutures.

from the cervico-vaginal junction to the posterior surface of the symphysis anteriorly, and over a corresponding area posteriorly. When these denuded areas are united to each other, a column is formed down the middle of the vagina with a narrow channel on either side through which the secretions can escape, and inversion of the vagina and protrusion of the uterus are effectually prevented if there is added to this an efficient perineorrhaphy for the lowermost support.

Before any of these plastic operations are performed the

vaginal walls should be restored to a healthy condition by replacement of the uterus. Its retention can be secured by rest in bed until such time as any ulcerated excoriated areas upon the vaginal mucosa have been covered by normal epithelium, and this is effected rapidly when the surfaces are no longer subjected to contact with the air, decomposing urine, etc. Under favorable circumstances an operator of moderate dexterity can complete all the necessary work at one sitting and avoid the distress of repeated anæsthesia.

MAL-POSITIONS

Anteversion.—Pathological anteversion may be produced by any cause which increases the weight of the normally anteverted



FIG. 120.—Anteversion. The uterus bisects the vagina at an angle too acute.

uterus or which brings increased pressure to bear upon its posterior surface. Anteversion, to an extent which would be considered pathological under other circumstances, is thus physiologically present in early pregnancy and the late puerperium owing to the increased weight of the uterus. Fibroid

tumors, sub-involution, and chronic metritis are the ordinary causes of pathological anteversion when brought about by the weight of the uterus.

The symptoms, aside from those produced by pressure upon the bladder, are entirely referable to the causative lesion. The bladder symptoms are increased frequency of urination, with possibly some burning and tenesmus. The diagnosis is established through bi-manual examination by which the fundus is



FIG. 121.—Anteflexion. "The cervix and body meet each other at an angle which theoretically is sharper than it should be."

found pointing forward with the anterior uterine wall too plainly palpable to the vaginal finger, while the uterus is straight and the cervix points back toward the upper portion of the sacrum.

Treatment of anteversion, *per se*, is not required as removal of the cause is sufficient to allow spontaneous cure of the displacement. Pessaries for the relief of anteversion can act only by exerting pressure on the fundus through the anterior vaginal wall and bladder, and thus are as likely to increase the bladder irritability as they are to allay it.

Anteflexion.—As stated at the opening of this chapter, a moderate degree of anteflexion is normal, and it is likely brought about by intra-abdominal pressure acting upon the posterior surface of the fundus, while contractions of the bladder draw the cervix forward and the sacro-uterine muscles hold the mid-portion of the uterus fixed in position a short distance in front of the sacrum. It is conceivable that if the sacro-uterine muscles are short, or the anterior vaginal wall is short, or if the posterior uterine wall is soft and poorly developed, the normally acting forces may produce an exaggerated degree of bending and thus lead to pathological anteflexion.

It is doubtful whether anteflexion itself causes any symptoms, aside from an occasional case of dysmenorrhea when the flexion is very sharp, and possibly sterility. Extreme anteflexion may interfere somewhat with the outflow of menstrual blood if clotting occurs, and that type of anteflexion in which the fundus is in its normal position while the cervix is drawn sharply up against the anterior vaginal wall, may be productive of sterility because it removes the cervix from the posterior vaginal fornix in which the semen naturally collects.

Anteflexion of the soft puerperal uterus may lead to very serious consequences by reason of the accumulation within it of lochial discharge which readily undergoes decomposition, the resulting toxæmia causing chills, fever, and other evidences of sapræmia. Many other conditions, especially if they happen to be associated with dysmenorrhea, are illogically attributed to anteflexion. Leucorrhea, endometritis, backache, headache, hysteria, and neurasthenia are many times present in the same patient in whom an anteflexion is found, but they really should be considered as coincidences only, not as results of the anteflexion.

Treatment is not indicated merely because the cervix and body meet each other at an angle which theoretically is sharper than it should be, and interference should be considered when, and only when, the symptoms complained of can reasonably be

attributed to the flexion. If the patient has severe dysmenorrhea which is cramp-like in character and associated with the expulsion of clots, measures should be instituted to overcome the narrowing which may be presumed to exist at the internal orifice. If in addition sterility exists and there is no tubal lesion to account for it, some method of treatment should be adopted which will carry the external uterine orifice further back toward the posterior vaginal cul-de-sac. Thorough dilatation of the cervix temporarily overcomes the stenosis and straightens the bend, and in married women this should be accompanied by curettage in hopes that pregnancy may take place, in which event a permanent cure can be anticipated through the nutritional changes which occur. Occasionally it will be found that the anterior lip is very short, when the deformity may be overcome by the trivial plastic operation of transverse incision of the vagina just above the anterior cervicovaginal junction, and suture of this incision in a longitudinal direction.

Dudley's operation, which consists in splitting the posterior lip of the cervix, with excision of a wedge-shaped section from each side of the resulting wound so that all raw surfaces may be covered with mucosa by suturing, is a logical method of forming a new opening so far posteriorly that it approximates the location of the normal cervical outlet. Acute ante flexion of the puerperal uterus should be met by washing out the retained lochial discharge, and the introduction into the uterus of a drainage tube of such caliber and thickness as to prevent recurrence.

Retroversion and Retroflexion.—These two mal-positions are so similar that they may be considered together. Their only difference lies in the direction of the uterine axis, which in retroversion is a straight line, while in retroflexion it is curved or broken at the level of the internal uterine orifice.

Deficient involution of the uterus and its ligaments following labor, together with injuries to the pelvic diaphragm, is the most frequent cause of backward displacement. Injury to the pelvic

diaphragm allows the heavy uterus to descend, while imperfect involution of the sacro-uterine muscles affords an opportunity for the cervix to drop downward and forward. In consequence of this combination the fundus falls back under the sacral promontory as soon as it has undergone sufficient involution, and intra-abdominal pressure then acts upon the anterior face of the uterus, with a fully developed retroversion or retroflexion as the result. Retroflexion is more common than retroversion because the soft puerperal uterine wall permits of bending more readily

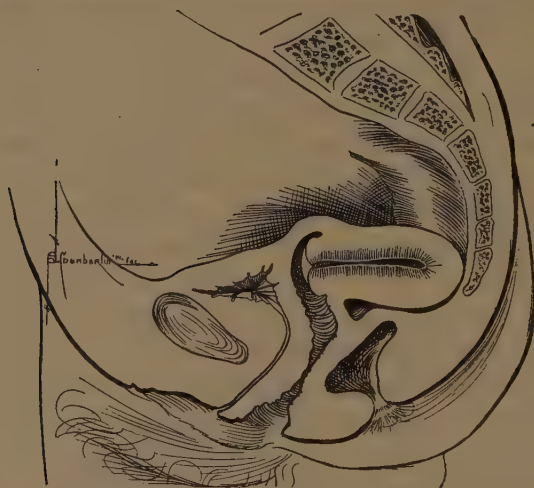


FIG. 122.—Retroversion. The axis of the uterus is a straight line.

than its supports permit of further descent. Over-distension of the bladder and the abdominal binder with a pad under it, are contributory causes of retrodisplacement during the second and third puerperal weeks, and early resumption of corsets during this time has the same deleterious effect.

Congenital retroversion and retroflexion, and backward displacement of the fundus associated with ante flexion of the cervix, make up a fairly large number of retrodisplacements, which, while small in proportion to those due to the injuries and sequelæ of labor, is by no means so inconsiderable as is usually taught.

Acute retroversion and flexion are sometimes produced by falls upon the buttocks and back, and result in the immediate onset of acute symptoms.

The older school of gynecologists laid great stress upon the importance of mechanical disturbances of the uterus, while at present many well-known authorities contend that posterior mal-positions alone and by themselves provoke no symptoms whatever, any discomfort being referred entirely to associated lesions and complications. It certainly is true that posterior



FIG. 123.—Retroflexion. The axis of the uterus is a curved line, concavity posteriorly.

displacements at times are wholly without symptoms and unknown to the patient unless discovered accidentally, but it is just as certain that in many more instances correction of a retroversion or retroflexion gives relief to many annoying symptoms, whether these symptoms are directly due to the displacement or not. Symptomless retrodisplacement is most likely to be found in virgins and nulliparous married women, while displacement without discomfort is rare in child-bearing women.

Symptoms.—The symptom most bitterly complained of is a sense of weakness and dragging in the lower abdomen, particularly if the patient stands a great deal. Walking usually provokes less discomfort than standing. Severe sacral backache is common, and leucorrhea is almost always present. Increased menstruation, sometimes so profuse as to be menorrhagic in character, is also common. Rather severe pain continued for several days and subsiding spontaneously, beginning without known reason and leaving in its wake a sensation of soreness over the entire lower abdomen, is a pronounced feature of many cases and gives weight to the view that much of the pain is congestive in character.

Vaginal examination shows the cervix to be nearer the vaginal outlet than normal, but the direction in which it points is unimportant. Bi-manual examination (always with the bladder and rectum empty) reveals the absence of the fundus from its normal location behind the symphysis and its presence posteriorly. If the patient is very spare and the abdominal muscles relaxed, the entire uterus may be grasped between the finger in the vagina and the hand on the abdomen, and its shape and size accurately determined. With thick resistant abdominal walls this is impossible, and the diagnosis must then be based upon the absence of the uterus from any portion of the pelvis excepting the recto-uterine excavation, and the presence therein of a body whose posterior surface corresponds to that of the uterus. Exceptionally it may be necessary to pass a sound, but ordinarily this is not only unnecessary but fraught with enough danger to make it inadvisable. An attempt should always be made to ascertain whether the uterus is movable or fixed. If it can be brought forward readily and does not at once return to its original position, adhesions are probably absent, but in many cases this is accomplished with difficulty or not at all, even when there are no adhesions. Sometimes one or both ovaries are palpable behind the uterus and are found to be freely movable, when the uterus also may be presumed to be free, as the well nigh universal

cause of uterine fixation is localized peritonitis resulting from salpingo-oophoritis. Assumption of the knee-chest position at intervals for several days usually will make it possible to replace the retroposed non-adherent uterus without difficulty, even if the first effort fails.

Occasionally a fibroid in the posterior uterine wall simulates a retroposed uterus to the vaginal touch, but persistence in the examination will enable one to map out the fundus anteriorly. When the conditions are reversed and a small fibroid nodule is present in the anterior uterine wall while the fundus is posterior, a positive diagnosis may be difficult to establish, but if two bodies can be felt the actual position of the uterus is subordinate in importance to the fact that a tumor is present.

When a large mass of exudate fills the pelvis it may be quite impossible to make out the position of the uterus, but again the position of the uterus is of no especial importance when compared to the damage wrought upon the tubes and ovaries by the infection which caused the exudate. Fixation of the uterus always exists under these conditions, and may be assumed to be present when there has been enough salpingitis to leave palpably thickened tubes.

Treatment.—The treatment of the uterus which is adherent posteriorly is the treatment of the condition which produced the adhesions. No attention need be given the displacement, *per se*, but the primary disease demands treatment. If an operation is necessary for the latter the mechanical disturbance should be corrected at the same time. The forcible breaking up of adhesions under anæsthesia is not always successful and is far more hazardous than an abdominal incision. Those who frequently open the abdomen are aware of the fact that pus foci exist which were wholly unsuspected, and the density of the adhesions is often so great that damage to the bowel occurs even when they are separated in plain view. It is difficult to imagine a combination of circumstances which would justify

the forcible breaking up of adhesions and replacement of the uterus without an open incision.

Acute retroversion or retroflexion demands immediate replacement and this can usually be accomplished bi-manually. One or two fingers are first inserted behind the cervix with which the body of the uterus is lifted from its bed. The hand which is upon the abdomen then endeavors to grasp the fundus and draw it forward, or at least maintain the advantage already gained, while the vaginal fingers are shifted to the front of the cervix and push it posteriorly toward the sacrum. If this maneuver fails the patient should be placed in the knee-chest posture and the cervix drawn down by vulsellum forceps as far as possible without causing pain. A large piece of cotton is then crowded against the posterior vaginal fornix in an endeavor to push the fundus forward, after which the patient should slowly resume the dorsal position, when it will usually be found that bi-manual reposition can be accomplished without difficulty. Opening the anus with a small speculum while the patient is in the knee-chest position will sometimes give assistance by allowing the rectum to fill with air, and it is wise to do this before having the patient turn upon her back preparatory to bi-manual reposition. Owing to extreme sensitiveness, or thick or rigid abdominal walls, these manipulations may fail to accomplish their purpose, and as immediate relief is demanded in acute retrodisplacements anæsthesia is indicated, under which any movable displacement can be easily overcome. In acute posterior displacement the uterus ordinarily retains the correct position once replacement has been accomplished, so that no mechanical support is necessary.

These directions for replacing the uterus serve equally well in chronic cases of mobile retroversion or retroflexion, excepting that anæsthesia is rarely called for inasmuch as there is no need for immediate replacement. As before mentioned, if the knee-chest posture is assumed for five or ten minutes twice a day, one will be able to replace the uterus a few days later should the first

attempt result in failure. In giving instructions for this, care should be taken that the patient understands the position, and that it is not effectual unless all constricting bands are removed from about the waist. Reposition with the sound is never necessary and is more dangerous than the displacement for whose correction it is sometimes advised.

In the management of chronic movable retrodisplacements, a distinction should be made between those patients who are seen within a few months after labor, and those who either never have been pregnant, or in whom the displacement has not been discovered until a year or more has elapsed since delivery. In the former class the patient should be given the benefit of postural and mechanical treatment in the hope that sufficient involution may yet be secured to effect a spontaneous cure. The author himself is convinced that if postural treatment is efficiently and intelligently carried out it will cure as many cases as will the pessary, and it has the advantage that it does not require the constant attention of the physician. Postural treatment does away with the frequent repetition of examinations which serve to keep the mind of the patient fixed on her genital organs, and she accepts the treatment as a form of gymnastic exercise.

Mechanical treatment with the pessary, however, is sometimes necessary, and in using it a few cardinal facts should be borne in mind. The pessary, first of all, is but an instrument which is designed to hold the cervix in its proper position an inch or thereabouts in front of the sacrum, and it should be used only *after* the uterus is replaced, not before. Again, the pessary acts as a lever and not by reason of its size. The posterior portion of the lateral bars is the short arm of the lever, the fulcrum is the posterior vaginal wall, and the longer portion of the lateral bars is the long arm of the lever which extends to the level of the posterior surface of the symphysis. The pessary cannot act if the cervix is so deeply torn that the posterior bar does no more than draw the lips apart, nor if the pelvic floor is so dam-

aged that the posterior vaginal wall offers no support. The pessary should not cause the slightest discomfort. A prolapsed ovary frequently fails to return to its normal position when the uterus is replaced, and in this event it may be pinched by the posterior bar and give rise to severe pain. Before dismissing the patient it is wise to have her walk about the room in order to be sure that no discomfort is produced by the change of position and consequent shifting of intra-abdominal pressure. Finally, the pessary should be removed at least once in three months and be allowed to remain out for several days, for the double purpose of preventing ulceration of the vaginal walls and ascertaining whether the uterus retains its normal position in the absence of artificial support. Should the uterus be found to remain in position a permanent cure is still uncertain and the pessary should be worn at least three months longer.

It is rarely necessary to go outside the Smith-Hodge and ring types of pessary in order to secure a well-fitting instrument for any case which is suitable for mechanical treatment. The approximate length is ascertained by inserting one finger into the posterior vaginal fornix and measuring the distance from this point to one just behind the symphysis. The width is gauged by the general size of the vagina. It should be said, however, that the longer one practises the more he is inclined to resort to a simple ring whose longitudinal and transverse diameters are, of course, the same.

The pessary is inserted by depressing the perineum with one forefinger, while the other hand insinuates the support obliquely through the vulvar cleft in order to avoid pressure upon the sensitive urethral orifice. After passing the vulva it is turned into that position which it is expected to occupy, when the posterior bar will be found in front of the cervix. By inserting one finger between the anterior bar and perineum, and then through the lumen of the pessary and over the posterior bar, it is hooked downward and backward and readily slips into place.

A pessary should never fit so tightly that the finger cannot be inserted between it and the vaginal wall in any direction.

In removing the pessary, slight downward traction should be made upon its anterior end. It is then rotated into an oblique position and comes away without difficulty. The patient should be shown the proper method of removing the pessary and instructed to do so at once if at any time it causes pain. If retroversion or retroflexion is discovered accidentally years after labor, or if pregnancy has never occurred, the propriety of any sort of treatment is doubtful unless there are symptoms definitely referable to the displacement. Most women are

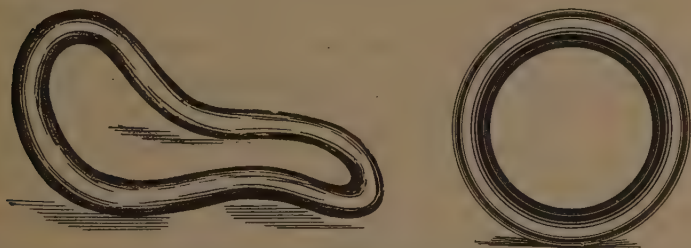


FIG. 124.—Smith and ring pessaries. "It is rarely necessary to go outside the Smith-Hodge or ring type of pessary."

exceptionally susceptible to the suggestion of anything wrong with the genital organs, and the knowledge that they have even a symptomless displacement is likely to do them more harm than its treatment will do good.

Old displacements of any sort are rarely cured by mechanical treatment, and this fact should be plainly stated to those patients in whom a displacement seems to be responsible for symptoms; but mechanical treatment for a short time will determine more definitely than anything else whether or not the symptoms complained of are due to the displacement. For this reason the pessary has a wide field of usefulness as a diagnostic instrument. If relief is obtained by its use, the patient should be told that she either must wear it indefinitely

or submit to an operation, and she should be allowed to decide which method shall be adopted. Retroposition without marked descent is entirely negligible in women who have passed the menopause, and no interference is necessary.

Operation is to be advised for retroversion and retroflexion; First, when the uterus is fixed, in which event correction of the displacement is an adjunct to whatever operation is made necessary by the primary disease; second, for chronic movable displacement in multiparæ, when the patient deliberately elects operation in preference to pessary treatment and there is reasonable ground for a belief that the displacement is responsible for the symptoms presented; third, it is to be advised with caution for congenital displacement, as nature has many times adjusted conditions to the abnormal position of the uterus and the patient may be made worse by an operation which fixes the uterus in a theoretically normal position. It is understood that injuries to the cervix or pelvic floor are to be corrected previous to or at the time the displacement itself is attacked.

Operative procedures are of three kinds. The first shortens the normal ligamentous supports of the uterus; the second adds a new ligament; and the third definitely fixes the uterus in a position of anteversion.

In the first class are to be placed all of the methods of shortening the round ligaments, as well as the much more difficult operation of shortening the sacro-uterine ligaments. In the second is the popular Kelly *suspension* operation. In the third are to be found all methods by which *fixation* to the anterior abdominal wall is accomplished, as well as the various forms of vaginal fixation.

The operation to be selected for the individual case is dependent upon certain elemental considerations, and no one operation is suitable for all retrodisplacements under all circumstances.

Of the round-ligament operations the Alexander may be considered when the degree of prolapse is negligible and the tubes

and ovaries are perfectly healthy. It has the advantage of not opening the peritoneal cavity and it does not interfere with future pregnancy or labor. On the other hand, it necessitates two incisions which are placed in that portion of the abdominal wall most prone to suppuration, and suppuration may lead to the subsequent development of hernia.

The Gilliam operation, like the Alexander, utilizes the strongest part of the ligaments, but it involves a very undesirable amount of handling of the subcutaneous tissue. It is to be remembered that no operation can be made absolutely aseptic, and that the fatty and muscular tissues of the abdominal wall are more readily infected than the peritoneum although infection of the latter is more dangerous to life if it does take place. The Gilliam presents an advantage which is inherent in all intra-peritoneal operations in that it may be performed as an adjunct to operations upon the tubes and ovaries. Of the methods of folding or shortening the ligaments intra-peritoneally, the only one worth considering is that which folds them *behind* the uterus. Its one defect lies in the fact that the weaker outer ends of the ligaments are utilized for support, but this probably is more than compensated for by the mechanical advantage which is gained by making traction upon the uterus from its posterior surface, thus tending to throw it so far forward that intra-abdominal pressure assists materially in retaining it in position. None of the round ligament operations are satisfactory when there is marked prolapse, but none of them interfere with subsequent pregnancy.

Ventro-suspension is satisfactory as an adjunct to operations upon the tubes and ovaries when these operations themselves are such as to induce sterility. It should not be done in child-bearing women, and even in those who are sterile it is not so advantageous as posterior round-ligament suspension, as the band produced by the former has been the cause of intestinal obstruction in many instances.

Ventro-fixation is never needed for posterior displacement

alone, but if posterior displacement is accompanied by marked prolapse in women who are past the menopause, or if displacement is associated with such serious inflammatory lesions that removal of the tubes and ovaries is necessary, ventro-fixation is the operation of choice. Ventro-fixation is preferable to vaginal hysterectomy in the third degree of prolapse, and then it should be associated with the proper plastic procedures, and in women of child-bearing age with resection of the tubes. To put the matter in another way, vaginal hysterectomy induces sterility, and in prolapse of so serious a nature as to justify sterilization, fixation with artificially induced sterility is the more satisfactory of the two.

INVERSION OF THE UTERUS

Acute inversion of the uterus usually occurs during the third stage of labor, at which time, if the placenta is firmly adherent near the fundus of the uterus, traction upon the cord may drag the fundus through the cervix. Acute inversion may also be produced during the vaginal removal of an intra-uterine myoma, traction upon a pedunculated tumor attached to the fundus sometimes inverting the latter through the cervix. As the fundus is larger than the remainder of the uterine body, it tends to become more completely and permanently inverted by the elastic constriction of the muscular cervix which now surrounds the upper narrow portion, as well as by the œdema produced through interference with the return circulation which is brought about in the same manner.

Fortunately, acute inversion taking place during vaginal myomectomy is partial only, and its principal importance lies in the possibility that the uterine wall may be perforated or ruptured when the pedicle of the tumor is cut through unless the special technique described under vaginal myomectomy is followed.

Inversion during the last stage of labor is an obstetric acci-

dent whose diagnosis and treatment are described in text-books on that subject, and chronic inversion usually is due to a failure to diagnose the accident at the time of its occurrence, the uterus remaining in its inverted condition if the patient survives.

The symptoms of chronic inversion may be trivial; menorrhagia, metrorrhagia and leucorrhea, with or without constant pelvic discomfort, being the usual complaints.

On digital examination the vagina is found to contain a firm, but elastic rounded body which bleeds readily, and whose sur-



FIG. 125.—Inversion of the uterus. Sagittal section.

face is velvety to the touch. If the finger can be insinuated between this body and the vaginal wall the ring of the cervix can be made out, but at no point within the circumference of the external uterine orifice is it possible to insert the finger more than a short distance without coming into contact with the uterine wall.

On bi-manual examination the fundus is found to be absent from its usual location, and if the abdominal wall is very thin and relaxed, a depression in the center of the supra-vaginal cervix

may be felt by the abdominal hand. Inspection through the speculum shows a red or bluish rounded body in the upper portion of the vagina, and the orifices of the tubes may possibly be

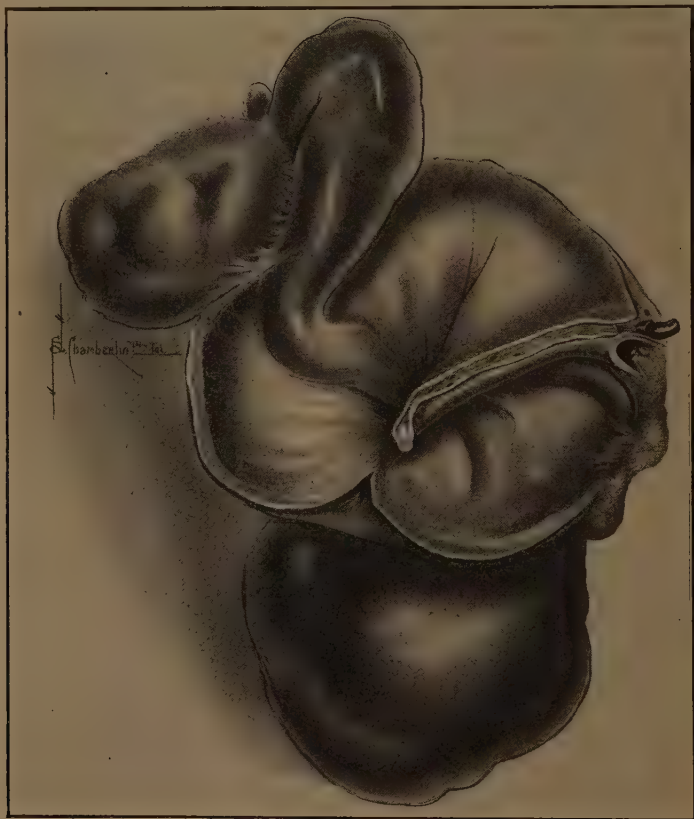


FIG. 126.—Inversion of uterus. Drawing from specimen, superior surface, showing cup shaped depression into which one tube is partially drawn. Tube contained pus. The other tube and ovary were not removed.

found if preceding manipulation has not been productive of too much hemorrhage.

Chronic inversion of the uterus can scarcely be mistaken for anything excepting a partially or completely expelled intra-

uterine myoma, and when the two co-exist a diagnosis may be impossible. Most frequently, however, chronic inversion is a sequel of labor, and the diagnosis is established by the absence of the fundus from its usual location and the presence within the vagina of a body corresponding in shape, size, and appearance to the uterus turned wrong side out.

Treatment.—A great variety of methods of treatment have been devised, some of which date back to the pre-antiseptic era and need no consideration at the present time.

Practically, three methods are available and may be tried in succession: manual replacement, deep incision of the cervix followed by manual replacement, and hysterectomy. If the case is recent and but few adhesions have formed between the adjacent peritoneal surfaces of the uterus, or between these peritoneal surfaces and the tubes and ovaries which are drawn into the depression, manual replacement under deep anæsthesia may succeed, the œdematous uterus being squeezed in the palm of the hand while the fingers and thumb make pressure on the cervico-corporeal junction. Considerable patience is necessary, and pressure upon the fundus and body of the uterus must be persistent in order to diminish the œdema before the uterus can be reduced to a size sufficiently small to permit of its return through the cervical ring.

Should this fail the cervix may be incised to or through the internal os both anteriorly and posteriorly, and manual replacement be again attempted, but care must be taken that these incisions do not extend into the peritoneal cavity as the endometrium is certain to be infected by its long-continued exposure in the vagina. Should the posterior incision accidentally pass into the abdominal cavity, the cervical incision should be closed as soon as the uterus is returned and the recto-uterine excavation be drained into the vagina. Failure of these manipulations to secure replacement should lead to hysterectomy, whether vaginal or abdominal being dependent upon the freedom of access to the vaginal vault.

Prolonged efforts at the preservation of an inverted uterus is a loss of time and leads to bruising and diminished vitality of the endometrium which in turn may give rise to a disastrous pelvic infection, so that radical measures are likely to prove more conservative unless the displacement is of recent occurrence and the endometrium is reasonably healthy. It is obvious that a greater effort should be made to save the uterus in a young woman than in one who is older even though more risk is involved, and the nearer the patient is to the menopause the more clear is the indication for radical operation.

PERFORATION OF THE UTERUS

Generally speaking, perforation of the uterus is an accident. It may take place during examinations with the sound, efforts at instrumental replacement of the uterus, intra-uterine operations, or the attempted induction of criminal abortion.

The results of the accident are dependent upon three factors: First, the size of the perforation; second, the sterility or otherwise of the uterine cavity and the instrument inflicting the injury; third, the associated damage to other abdominal viscera.

A perforation which is inflicted with a clean sound or similar small blunt instrument, passed through a non-infected uterine cavity, and withdrawn without damage to the intestine, is not likely to be followed by serious consequences.

A large perforation may lead to intestinal prolapse and strangulation.

Perforation with an unclean instrument, or perforation with an instrument previously sterilized, but introduced through an infected cervix or uterine cavity, may lead to local or general septic peritonitis. Perforation with a long sharp instrument, even though it be small and clean, may mean damage to the intestine or bladder with contamination of peritoneum, virulent infection, and death.

The most deplorable instances of this accident are those which occur during curettage of a pregnant or recently pregnant uterus. The softness of the uterine wall during pregnancy leads to extensive laceration, and the uterine cavity is so large that the operator may not be aware of the accident until serious or fatal damage has been inflicted upon the intestine or its mesentery.

Symptoms and Diagnosis.—If the patient is not anæsthetized she may experience severe pain when the instrument impinges upon the parietal peritoneum or mesentery, otherwise there may be no immediate symptoms. The operator should be aware of the fact that his instrument has passed beyond the limits of the uterine cavity. Should any suspicion arise that this is the case, the instrument should be manipulated very carefully until it is definitely determined whether or no its extremity has gone through the uterine wall.

Sudden relaxation of the uterus under anæsthesia is not uncommon, but its walls are always present and may be felt, while perforation with any ordinary instrument permits it to be pushed on indefinitely without meeting resistance.

Reported instances of the introduction of sounds through the uterine cavity into the tubes were more likely either perforation or sudden relaxation.

Treatment.—Perforation of a sterile uterus with a sterile sound or small dull curette needs no treatment if the accident is recognized. If there is any reason to believe that the perforation is larger than the instrument which produced it, the uterus should be packed with gauze, but under no circumstances should it be irrigated. On two occasions the author has seen the uterus unnecessarily removed because a trivial perforation had been discovered.

Should the injury to the uterine wall be at all extensive or the uterus be infected, or if there is any possibility of damage to the intestine or bladder, the abdomen must be opened and the conditions which are found treated upon their merits. If

the accident is not discovered until after the uterus has been irrigated or swabbed with antiseptics, the abdomen must be opened, the irrigating fluid removed, the perforation sewn up, and the pelvic cavity filled with saline solution to minimize the irritating effect of the antiseptic.

Perforation with a dirty instrument, or with a clean instrument through an infected uterus, calls for immediate opening of the abdomen with careful cleansing of the pelvic cavity. The perforation may be closed if it is small and the cleansing seems efficient, but the uterus must be removed if the combination of injury and infection makes its removal less dangerous than its retention.

Peritonitis resulting from a neglected infected perforation should be treated as though it had arisen from any other source, there being nothing peculiar about it because of its origin.

RUPTURE OF THE UTERUS

Rupture of the uterus implies that force has been used and the tissues more extensively damaged than in simple perforation.

Rupture of the uterus is generally of obstetric origin, but it may take place during forcible dilatation of the cervix of a non-pregnant uterus. As an obstetric accident it is of serious import and is fully dealt with in works devoted to that subject. Occurring during a gynæcological operation it may cause serious hemorrhage, or, if the case is unclean, dangerous infection. When rupture occurs during cervical dilatation, the sudden disappearance of resistance is unmistakable, and the diagnosis is never in doubt.

Clean ruptures into the broad ligament are often managed successfully by careful packing to control the hemorrhage. If bleeding persists in spite of packing, hæmostasis is accomplished by suture or ligature even if necessary to split the infra-vaginal cervix in order to expose the site of injury.

Clean tears through the peritoneal-covered surface of the

uterus extend into the abdominal cavity and they also may be treated by packing, but abdominal incision and suture of the laceration gives greater security against hemorrhage and subsequent infection.

If infection is present in the cervix or body of the uterus and a rupture occurs which opens into the abdominal cavity, the safest procedure is to open the abdomen and repair the injury or remove the uterus according to the circumstances. Drainage into the vagina should be established unless the infection is known to be of so mild a character that subsequent peritonitis need not be apprehended.

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CHAPTER X

OPERATIONS UPON THE UTERUS AND ITS LIGAMENTS

Curettage.—Probably no operation is so much abused as uterine curettage, the sole direct result of which is incomplete removal of the mucosa of the body and fundus of the uterus. It may be performed for diagnostic purposes, for hyperplastic or hypertrophic endometritis manifesting itself by hemorrhage, and very rarely for chronic purulent endometritis of non-gonorrheal origin. Curettage is also justifiable for sterility if the patient is perfectly normal otherwise. Curettage is positively contra-indicated in the presence of gonorrheal infection of the vulva, vagina, cervix, or tubes.

The dangers of curettage are infection and perforation of the uterus.

Pre-operative cleansing should be academic in its thoroughness. The vulva should be clipped or shaven and the external genitalia bathed the night preceding the operation. A $\frac{1}{2}$ per cent. douche of creolin or lysol is given on the night preceding the operation and repeated before the patient is sent to the surgery. After anæsthetization the vulva is again scrubbed with soap and sterile water followed by alcohol, and the vagina is washed out by a nurse who wraps a piece of gauze about the gloved fingers and proceeds carefully and systematically over every portion of the vaginal surface. Following this another large douche of 1-4000 bichloride solution, 1-100 lysol or creolin, or a prolonged douche of sterile water is used.

Sterile towels and sheets drape the legs and buttocks, and

gloves are worn by all concerned precisely as for a major operation.

Another bi-manual examination is now made to exclude tubal disease. When assured upon this point the perineum is re-

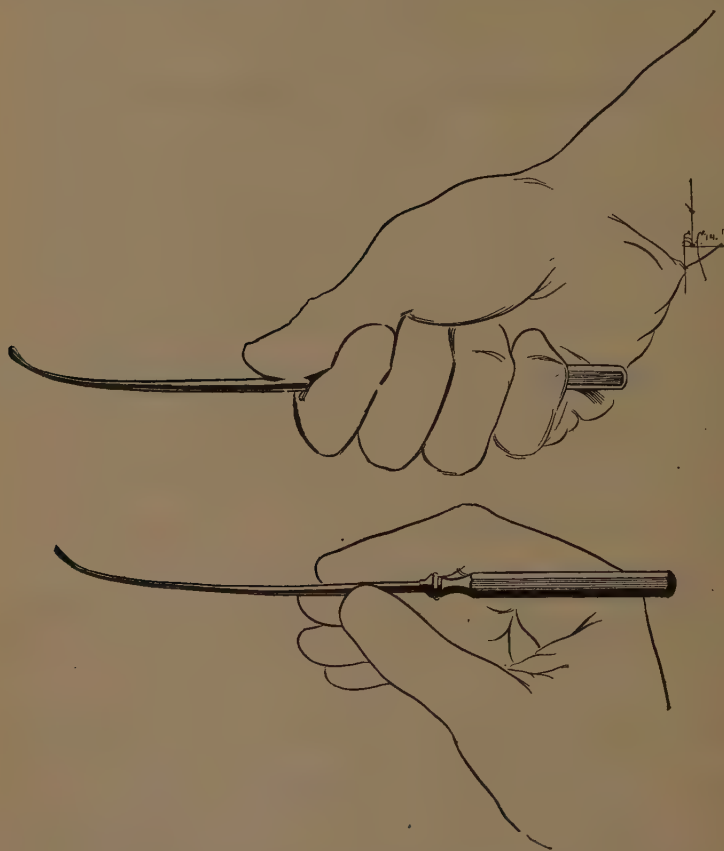


FIG. 127.—Curettage. "The curette is held lightly between the thumb and first and second fingers, not in the closed hand.

tracted, the cervix seized with volsellum forceps, and dilated as previously described.

Preliminary dilatation is not often required in order to allow the curette to be introduced, but it renders the manipulations

easier and assures the return of the solutions which are used for irrigation.

The curette with a sharp edge is preferred for gynæcologic curettage as the dull wire instrument will not remove the mucosa without the use of undue force, and perforation is favored by forcible pressure applied to the wall of the uterus, rather than by scraping with a sharp-edged loop.

The curette is held lightly between the thumb and first and second fingers, and not in the closed hand. The walls of the uterus are scraped systematically, giving especial attention to the uterine horns and the top of the fundus. The Recamier curette is somewhat superior to those in common use for removing the mucosa about the tubal openings and along the fundus.

When the instrument impinges upon firm tissue over the entire uterine wall the curette is laid aside and the irrigator carefully introduced. Dèbris and clots are thoroughly washed out with sterile water, care being taken that the fluid escapes as rapidly as it flows in. Antiseptic solutions, and swabbing or packing of the uterus are generally unnecessary. The vagina is dried, the uterus replaced, and a sterile dressing applied to the vulva.

The after-care is simple. The vulva is protected by sterile dressings and douched after each urination and defecation. No vaginal douches are used. The diet should be restricted to the necessities of a resting individual and the bowels maintained in normal condition by enemas or mild laxatives. The patient remains in bed for four or five days and after a week may gradually resume her usual occupation.

VAGINAL FIXATION

Fixation of the uterus through the vagina is rarely indicated, prolapse of the uterus and vagina in a patient with an extremely thick abdominal wall, or in one who has a decided aversion to

abdominal incision affording the indication for an occasional resort to the operation.

Like all forms of uterine fixation it is positively contra-indicated if there is a possibility of future pregnancy.

After the usual preparation the patient is placed in the lithotomy position and the cervix drawn through the vulva with tenaculum forceps. A transverse incision is made through the



FIG. 128.—Vaginal fixation. Line of incision for reflexion of vaginal flaps.

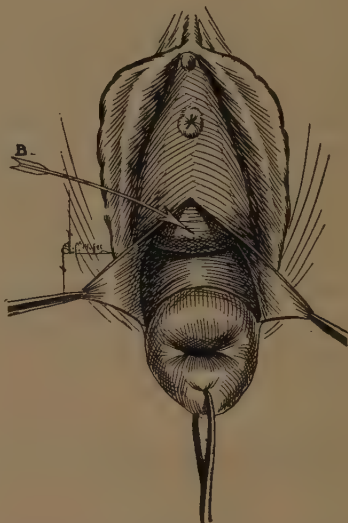


FIG. 129.—Vaginal fixation. "By dissecting up the flaps just outlined the bladder is exposed."

vaginal mucosa at the anterior cervico-vaginal junction. A longitudinal incision through the anterior vaginal wall meets this at a right angle, the anterior end of the second incision being placed at the level of the internal urethral orifice. By dissecting up the flaps thus outlined the bladder is exposed and carefully pushed away from the vaginal wall laterally for a distance sufficient to allow the uterine fundus to be implanted between them. The bladder is then pushed away from the supra-vaginal

portion of the cervix by the gauze-covered fingers, care being taken that all pressure is made against the cervix in order to guard against injury to the bladder. The peritoneum is exposed and torn through at the vesico-uterine excavation. With the fingers or forceps the uterine fundus is then grasped, ante-flexed through the peritoneal opening, and tucked beneath the

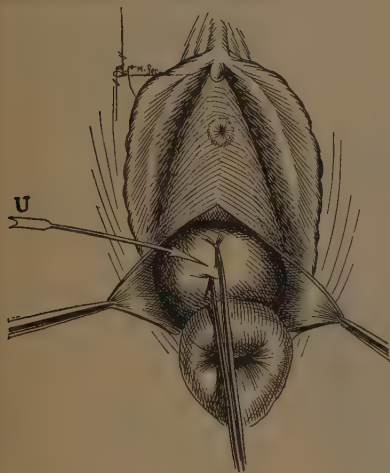


FIG. 130.

FIG. 130.—Vaginal fixation. The previously exposed bladder has been pushed away from the cervix, the peritoneum torn through and the fundus ante-flexed through the peritoneal opening.



FIG. 131.

FIG. 131.—Vaginal fixation. The uterine fundus has been sharply flexed forward and sutures to close longitudinal vaginal incision include some uterine tissue.

bladder and between it and the anterior vaginal wall. Interrupted sutures close both the longitudinal and transverse incisions in the anterior vaginal wall, and one or two of them should secure some uterine tissue in their grasp.

The result of this procedure is firm fixation of the uterus in a position of extreme anteversion with the bladder elevated above the uterine body.

VAGINAL HYSTERECTOMY

In the average surgical practice vaginal hysterectomy probably is most frequently performed for prolapsus uteri, in which, according to the author's views, it is rarely indicated. For *very early* carcinoma of the uterus, for small fibromata, and for uterine hemorrhage at or near the menopause which persists in spite of repeated curettage, it may be used as a curative measure.

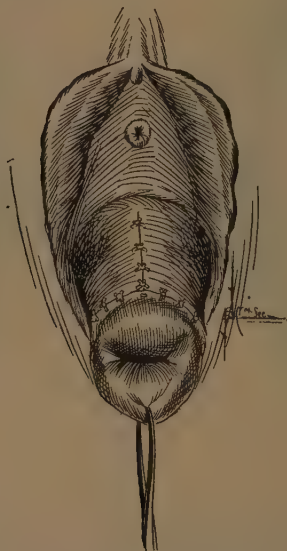


FIG. 132.—Vaginal fixation. Vaginal incisions closed. When cervix is released from volsellum the uterus will straighten out with its fundus under bladder.

In advanced carcinoma of the cervix it is sometimes performed in order to overcome the hemorrhage and foul discharge, although it offers no promise of cure of the disease itself.

For some years, under the lead of French and Belgian surgeons vaginal hysterectomy was extensively performed for pelvic inflammatory disease, but at the present time more conservative methods again prevail.

Vaginal hysterectomy is most easily performed when there is a small, freely movable, non-adherent uterus, a capacious vagina and a relaxed outlet. It becomes progressively harder the smaller the vagina and the larger the uterus, and is very difficult indeed if that organ is both enlarged and densely adherent.

The major dangers are hemorrhage, injury to the bladder, ureters, and intestine.

After the patient is in the lithotomy position and the final cleansing finished, the perineum is retracted and the cervix

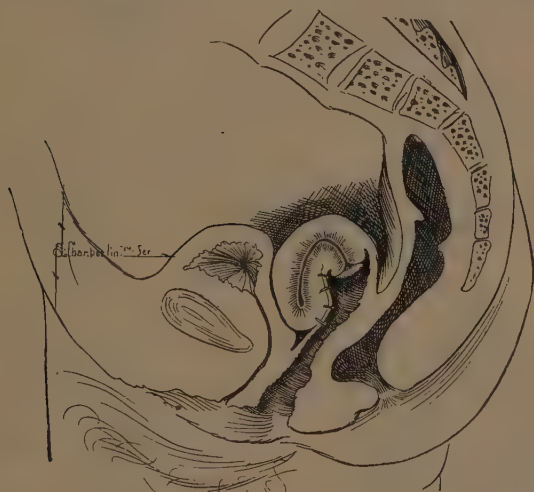


FIG. 133.—Vaginal fixation. Sagittal section after operation is completed.

drawn down as far as possible. The cervico-vaginal junction is demonstrated by pushing the cervix within the vulva and noting its attachment to the vaginal wall, and this is now severed by a circular incision which extends completely around the cervix. Active bleeding is controlled by hæmostats at this time. The connective-tissue attachments, both in front and behind, but not at the sides of the cervix, are now pushed off with a gauze-covered finger which makes pressure against the cervix. A strand of dense tissue is present in the mid-line anteriorly and

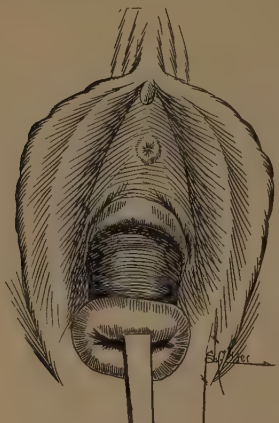


FIG. 134.

FIG. 134.—Vaginal hysterectomy. Cervico-vaginal attachment has been severed by a circular incision and flap rolled back; anterior view.

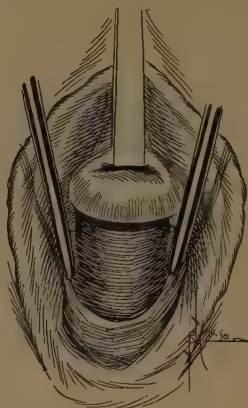


FIG. 135.

FIG. 135.—Vaginal hysterectomy. Cervico-vaginal junction has been severed and flap rolled back. Clamps on bases of broad ligaments; posterior view. "It is optional whether clamps be placed now or later."



FIG. 136.—Vaginal hysterectomy. Incision of peritoneum after stripping bladder from cervix. Broad ligament bases clamped.

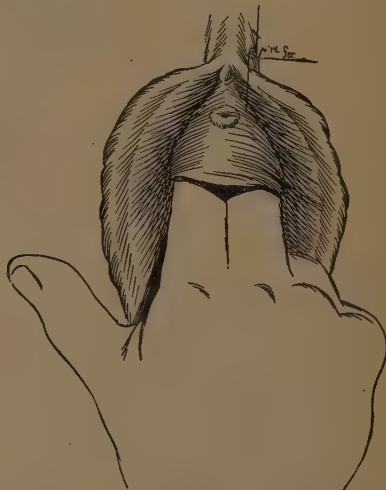


FIG. 137.—Vaginal hysterectomy. The fingers are inserted into the opening between the bladder and uterus in order to anteflex the fundus into the vagina.

usually requires snipping with a scissors whose points are kept in contact with the cervix. Dry dissection with the finger is continued anteriorly and posteriorly until the peritoneum appears in the depths of the wound. This is recognized by its thinness and the fact that it moves independently of the viscera above it. The peritoneum may be torn through with the fingers, or caught and cut as in opening the abdomen through the anterior wall. Both anterior and posterior openings through the peritoneum are torn laterally by the introduction of the fore-fingers of either hand, after which the uterus is found to be suspended by the broad ligaments and the structures between their folds.

Two methods are available for controlling the blood supply to the uterus before proceeding to its removal by severing the broad ligaments.

A. By Clamp.—It is optional with the operator whether this step shall be performed before the peritoneum is opened as described in the preceding section, but in either case the first pair of clamps should not enter the abdominal cavity. The cervix is drawn strongly to one side and the first clamp applied to the base of the broad ligament on the opposite side close to the supra-vaginal portion of the cervix. The same procedure follows for the other base. If difficulty is experienced in drawing down the uterus, that portion of the broad-ligament base now embraced by clamps may be severed on both sides between the clamps and the cervix. With tenaculum forceps and fingers the uterus is now anteflexed through the anterior vaginal incision. If the tubes and ovaries are diseased they are drawn through the opening at the same time. A finger is hooked over the top of the broad ligament on one side, the end of the finger touching the clamp already placed from below, and another clamp is then applied to the broad ligament from above downward so that its tips contact with those of the first clamp. The broad ligament which is held in the grip of these

two clamps is now cut from above downward until the incision meets the one which was made from below.

The uterus is now held only by the top of one broad ligament and may be swung entirely outside the vagina while this ligament is clamped from above and the uterus cut away. If the tube and ovary of either side are to be removed, the clamp which



FIG. 138.—Vaginal hysterectomy. The base of the right broad ligament clamped from below upward. The top of the right broad ligament clamped from above downward.

controls the top of the broad ligament of that side is placed external to the appendages, but if they are to be saved the clamp should be between the ovary and the uterus.

If the maneuvers have been skillfully performed only these four clamps are needed to control the vessels in the broad ligaments. If the clamp method is to be used in its entirety,

the hæmostats on the vaginal incision are tied off, and the cavity from which the uterus was removed is lightly packed with iodoform gauze to a point above the tips of the clamps. The vagina is now packed with gauze around the shanks of the clamps in such fashion as to prevent them from coming into contact



FIG. 139.—Vaginal hysterectomy. The right broad ligament severed and the uterus swung out. The left broad ligament clamped.

with the vaginal wall, and a large sterile dressing is applied to the vulva.

If ligatures are to supplant the broad-ligament clamps for permanent hæmostasis, they are applied after the uterus is removed, and are tied as close to the clamps as possible. Catgut may be used for this purpose, but a good-sized silk thread is safer, and as the tissue which was caught in the grasp of the

forceps usually sloughs, no sinus is to be apprehended from retention of the knot. It is especially important to loosen, but not remove, each forcep as the first knot is drawn down behind it. Unlocking the forcep assures compression of the tissues by the ligature, and by keeping it in position until the first knot is tied retraction and loss of the stump are prevented.

A modification of this method is necessary if for any reason the uterus cannot be anteflexed through the anterior vaginal incision, and six or eight clamps may be needed instead of four.



FIG. 140.—Vaginal hysterectomy. Pryor's clamps with detachable handles have been left for permanent hæmostasis. Gauze covers the tips and shanks of the clamps.

This modification consists in first clamping the broad ligament bases and severing them from below as above described. The uterus thus partially freed is drawn lower and another pair of clamps applied on the tissue lateral to the uterus, this tissue then being cut between the uterus and clamps. This clamping and cutting is repeated until the uterus is entirely free, when the clamps may be left in place or supplanted by ligatures as desired. Greater care must be used in applying the clamps in this manner lest intestine be caught, and the uterus should be closely hugged at each

succeeding application to guard against including the ureters.

B. Ligature Method.—The cervico-vaginal attachment having been severed, the bladder dissected away anteriorly, and the peritoneum opened both in front and behind the uterus, the broad-ligament base on one side is perforated by a blunt needle carrying a heavy ligature. This ligature is tied just far enough from the cervix so that sufficient stump is left within its grasp to prevent slipping. The tissue between the ligature

and cervix is severed, and the process of tying and cutting repeated, first upon one side and then on the other, until the uterus is freed.

When any ligature method has been used, the round ligaments and a portion of the broad ligaments may be sewn together across the cavity from which the uterus has been



FIG. 141.—Vaginal hysterectomy. Method used when uterine fundus cannot be brought through wound. The broad ligaments are clamped and cut piecemeal from below upward.

removed, thus surrounding the opening and at the same time assisting to maintain the integrity at the vaginal vault. Some space should be left for drainage, however, as vaginal hysterectomy cannot be performed in an absolutely aseptic manner and the great safety of this operation probably is due to free drainage through the vagina.

After-care.—If clamps are left the patient should be catheterized until they are removed, and care be taken not to loosen them accidentally during catheterization. Pryor's clamps with removable handles are an effectual safeguard against this accident, and they also minimize the patient's discomfort during the first few days.

The clamps are removed in from 48 to 72 hours, each clamp being unlocked and allowed to remain in position for a few moments in order to be sure that hemorrhage will not occur. It is then slowly and gently withdrawn. The gauze in the pelvic cavity is left until it is thoroughly loosened which usually requires seven or eight days, but the vaginal gauze may be changed once or twice during this time if it becomes offensive. Iodoform gauze remains sweet much longer than plain gauze and thus needs less frequent changing. Douches are not necessary until all the gauze is permanently removed, and even then they should be given without pressure so that fluid is not forced into the pelvic cavity.

The bowels should not be moved until the clamps are off, and should then receive the same attention as in any operation involving the peritoneal cavity. The patient should remain in bed until union is firm, usually about two weeks.

Special Points in Technique.—1. The operation is easier if the peritoneum is opened before clamping and cutting the broad-ligament bases, but this is not imperative and under some circumstances is impossible.

2. Injury to the bladder can be avoided only if the dissection anterior to the uterus is made close against the cervix.

3. The risk of clamping or tying the ureters is minimized by pushing the bladder away from the broad ligament at either side of the cervix, and hugging the uterus closely with clamps and ligatures.

4. Hemorrhage must positively be controlled either by clamps or ligatures before the operation is completed.

INGUINAL SHORTENING OF THE UTERINE LIGAMENTS

Shortening the round ligaments through the inguinal canals is a recognized method of treating movable retroversion and retroflexion, and its indications are discussed sufficiently under displacements.

All operations of this type are based upon the original Alexander operation, and while numerous modifications have been presented from time to time, any method is satisfactory by which



FIG. 142.

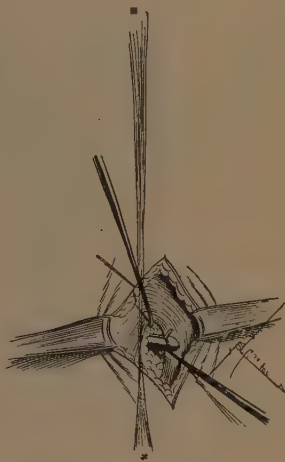


FIG. 143.

FIG. 142.—Inguinal shortening of the round ligaments. Line of incisions.

FIG. 143.—Inguinal shortening of the round ligaments. The right round ligament has been isolated from the fatty tissue in the inguinal canal.

the ligaments are demonstrated in the inguinal canals, drawn out until the uterine fundus meets the anterior abdominal wall, and folded upon themselves or otherwise shortened in such manner as to retain the uterus in that position.

An incision through the skin and subcutaneous fat extending from the level of the abdominal inguinal ring to the pubic bone, and paralleling the inguinal ligament, exposes the fatty tissue in the subcutaneous ring. This fatty tissue is teased apart with

forceps or picked up on blunt hooks until definite muscular fibers appear. It should be remembered that the ligaments fray out rapidly as they approach the mons pubis and are thicker toward the abdominal ring. So soon as these muscle fibers are found they should be traced upward and freed from fat until the outline of the ligament is plainly visible, when the ligament is completely isolated to its exit from the abdominal cavity. Gentle traction causes the ligament to "run" through the inguinal canal and abdominal ring.

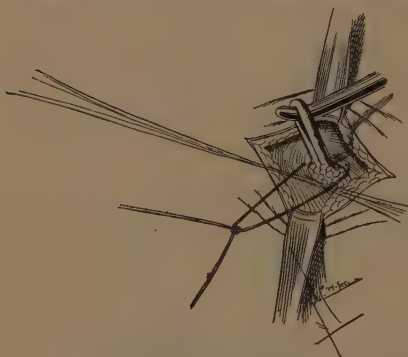


FIG. 144.—Inguinal shortening of the round ligaments. The right round ligament has been drawn out and a stitch inserted through the doubled ligament and internal pillar.

Both ligaments having been demonstrated and cleared, they may be shortened by folding them upon themselves and stitching the folds together, greater security being obtained by inserting one or two sutures through the ligament and one of the pillars of the subcutaneous ring. Gersuny makes a tunnel under the skin and superficial fascia between the inferior ends of the

two incisions, and fixes the ligaments in this tunnel with sutures.

Difficulty is sometimes experienced in picking up the ligament in the subcutaneous ring, either because it is much thinned out or absent. In this event a stab wound may be made through the abdominal muscles over the abdominal ring and the ligaments picked up with blunt hooks at this level, brought through the muscle incision, and stitched to the external surface of the external oblique aponeurosis.

Separation of the pillars of the ring, or any incision in the muscles covering the inguinal canal, should be carefully repaired or a hernia may result. Should peritoneum appear when the ligaments are drawn out, it is to be wiped upward to avoid the

formation of a peritoneal pouch which is the first step in the evolution of a post-operative inguinal hernia. Hæmostasis should be absolute and asepsis pedantic, as suppuration is in-

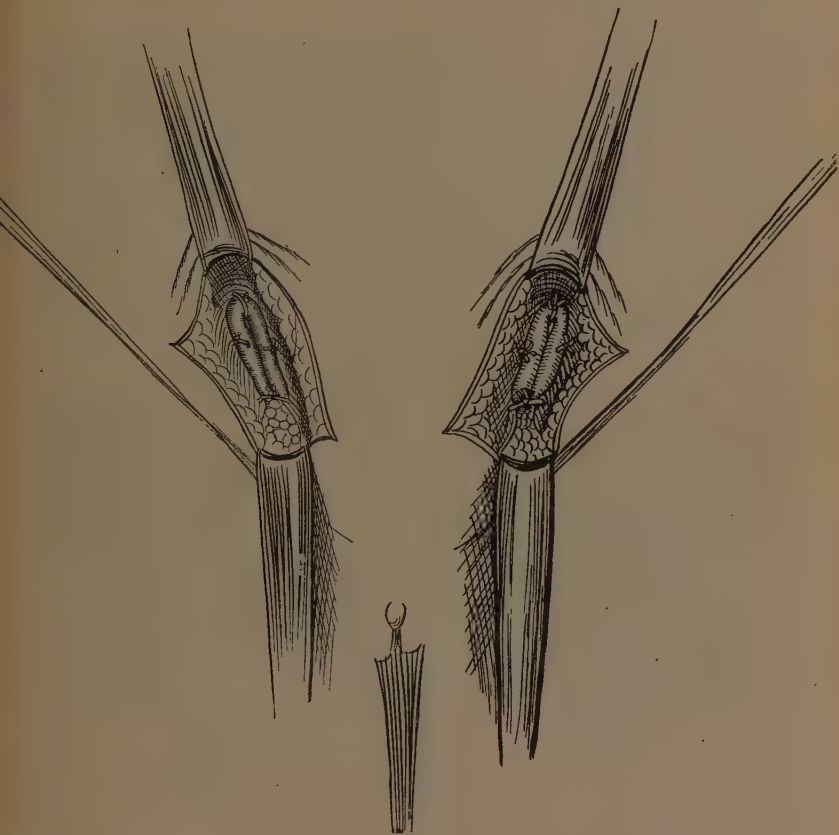


FIG. 145.—Inguinal shortening of the round ligaments. Both ligaments have been stitched to the external oblique aponeurosis.

duced more readily in this locality than in any other portion of the abdominal wall.

The after-treatment is that of a simple laparotomy, but especial care is necessary that the bladder does not become distended and force the uterus posteriorly before healing is

complete. A pessary may be introduced at the close of the operation and allowed to remain for several weeks to assist in retaining the uterus in its normal position if a plastic operation has not been performed at the same sitting.



FIG. 146.—Intra-abdominal shortening of the round ligaments. The Gilliam operation. The round ligaments are surrounded by loops of silk to act as tractors. Diagrammatic. (*Redrawn from Gilliam.*)

INTRA-ABDOMINAL SHORTENING OF THE UTERINE LIGAMENTS

Various methods have been devised for shortening the round ligaments after opening the abdomen, but the two most generally useful are the Gilliam and the Baldy-Webster.

The salient points of the Gilliam are as follows: After the abdomen is opened in the mid-line the anterior sheaths of the recti are cleared of fat and a perforation is made on either side, 2 cm. external to the margin of the incision. This perforation is 4 cm. above the crest of the pubes and extends through all the layers of the abdominal wall beneath the superficial fascia

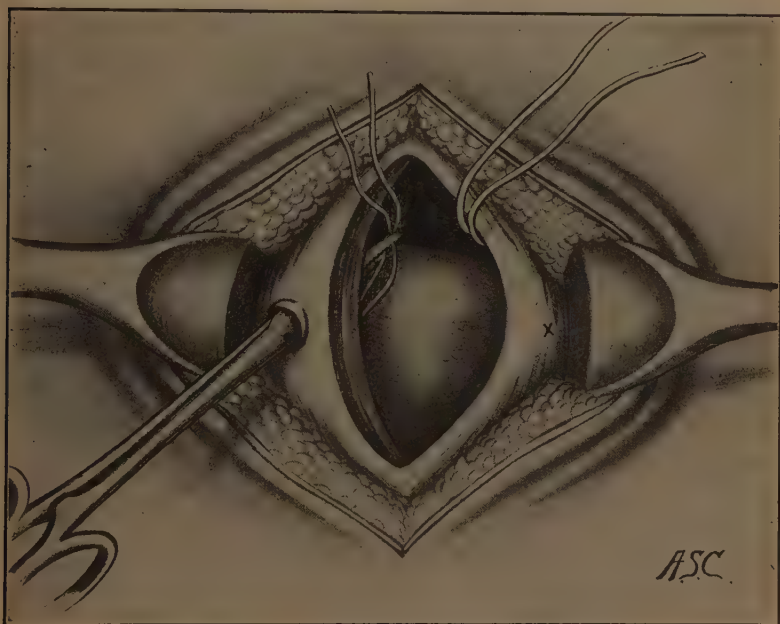


FIG. 147.—Intra-abdominal shortening of the round ligaments. The Gilliam operation. A perforation has been made through the right rectus fascia and muscle through which the ligament is to be drawn. (*Redrawn from Gilliam.*)

and fat. One round ligament is surrounded by a loop of silk 4 cm. from its uterine attachment, and with a blunt instrument this loop is drawn through the above-mentioned perforation pulling the ligament with it. This procedure is repeated on the other side, and the operation is finished by stitching each loop of round ligament to the margin of the perforation through the rectus fascia.

The advantages of the Gilliam operation are that it does not interfere with future labor and that it suspends the uterus by the stronger inner ends of the ligaments. Its disadvantages are the formation of two bands in the abdominal cavity, and the possibility that one or both ligaments may give way because of pressure atrophy of that portion which extends through the abdominal muscle and fascia.

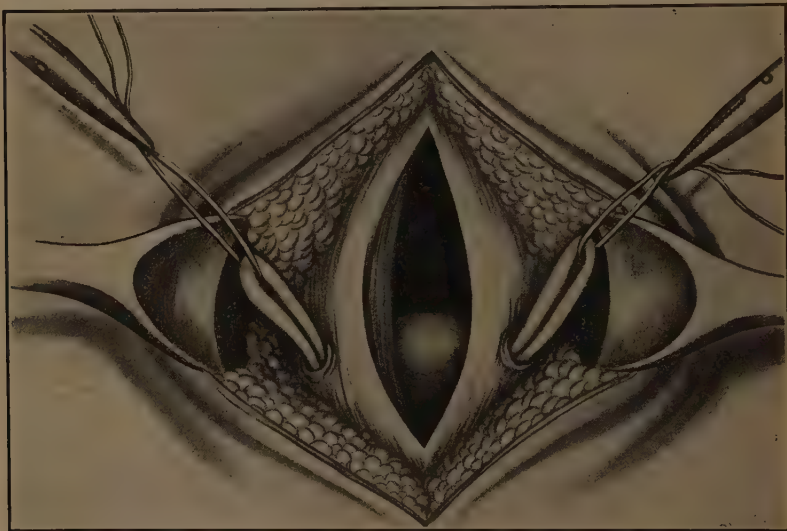


FIG. 148.—Intra-abdominal shortening of the round ligaments. The Gilliam operation. Loops of both round ligaments are ready to stitch to anterior sheath of rectus. (*Redrawn from Gilliam.*)

The method of shortening the round ligaments known as the Baldy-Webster operation is applicable to the same class of cases as the Gilliam. By it the uterus is brought forward into a normal position, but instead of its being suspended from the anterior abdominal wall the ligaments themselves are shortened and given a new point of attachment to the uterus. In order to accomplish this the uterine tube is raised and a hæmostat thrust from behind forward through the clear space just external to the lateral uterine wall. The round ligament

is caught in the jaws of the hæmostat and drawn back through the perforation in the broad ligament. This is repeated on the other side and sufficient traction made upon the ligaments to render them taut up to their entrance into the abdominal wall. The requisite degree of tension being ascertained, the ligaments being folded upon themselves are stitched to the posterior wall

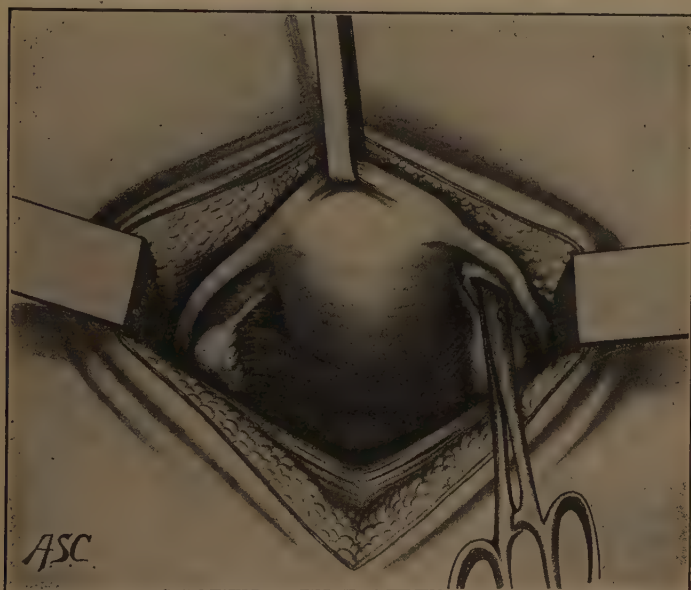


FIG. 149.—Intra-abdominal shortening of the round ligaments. The "Baldy-Webster" operation. "The uterine tube is raised and a hæmostat thrust from behind forward through the clear space." If the ovary is prolapsed this perforation should be below the ovarian ligament.

of the uterus. If they are sufficiently long, the folded ligaments may also be sutured to each other. The new attachment of the ligaments to the posterior uterine wall should not be more than 3 cm. below the fundus. If they are attached lower than this there is danger that the uterus may somersault over them, and thus make the displacement worse than before. After the ligaments have been sutured to the posterior uterine wall,

each one should be stitched to the margin of the opening in the broad ligament through which it passes in order that no opportunity may be afforded for prolapse of a knuckle of intestine and possible strangulation. A small triangular space may be found just external to the lateral wall of the uterus, both above and below the round ligament, and this should be closed for the same reason.

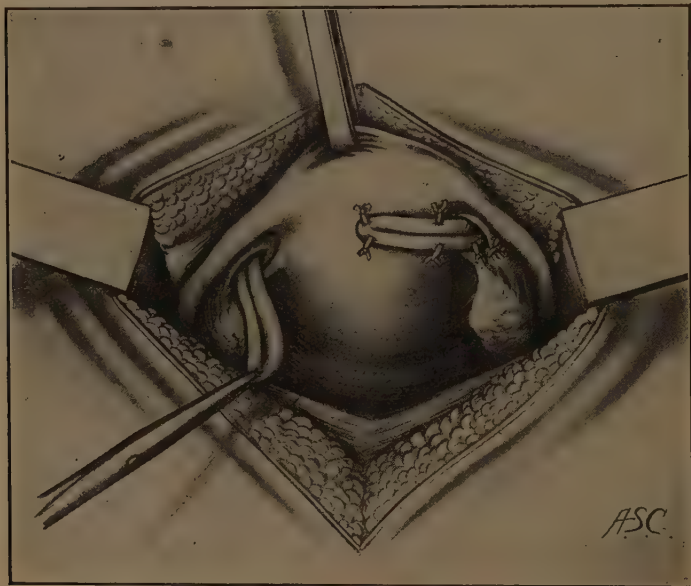


FIG. 150.—Intra-abdominal shortening of the round ligaments. The “Baldy-Webster” operation. One ligament has been sewn to the posterior wall of the uterus just below the fundus. The second ligament is ready for suturing.

A modification of this operation consists in stitching the posterior layers of the broad ligaments to the posterior surface of the uterus simultaneously with the attachment of the round ligaments thereto, and by still another modification the ligaments are drawn through a tunnel between the peritoneal and muscular coats of the posterior uterine wall in order to avoid the formation of adhesions.

While other methods of intra-abdominal shortening of the round ligaments are possible, such as folding them in front of the uterus, or folding them upon themselves during their course through the broad ligament, none of them present the advantages of the above-described posterior method. The only disadvantage of the operation has been mentioned before, and



FIG. 151.—Intra-abdominal shortening of the round ligaments. The "Baldy-Webster" operation. Both ligaments have been stitched to the posterior uterine wall. The ligaments have been stitched to the margins of the openings in the broad ligaments to obviate possible intestinal strangulation.

lies in the fact that the outer weaker extremities of the ligaments support the weight of the uterus. This is probably more than compensated by the fact that the round ligaments now have their uterine attachments on the posterior surface of the uterine body, whereas they are normally attached a trifle anterior to the mid-line. The forward pull upon the uterus which is secured by this operation has a mechanical advantage that is

not gained by any other operation so far devised, in that it throws the uterus so far anteriorly as to permit intra-abdominal pressure to act on the posterior face of the uterus, and so assist in maintaining it in its normal position. If an ovary is prolapsed, the perforation through which the round ligament is drawn should be made beneath the utero-ovarian ligament instead of between it and the tube.

VENTRO-SUSPENSION

The popular ventro-suspension operation which was devised by Howard Kelly has a limited field of usefulness and has



FIG. 152.

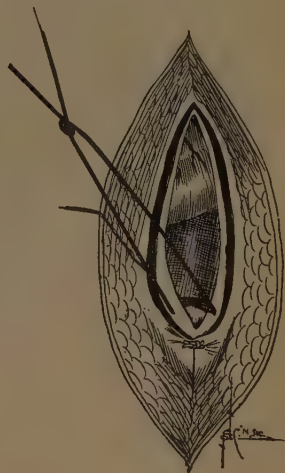


FIG. 153.

FIG. 152.—Ventre-suspension of the uterus. Two stitches are inserted. A silk stitch “catches the peritoneum on one side of the incision then bites into the posterior surface of the uterus just below the fundus and passes out through the peritoneum on the other side.”

FIG. 153.—Ventre-suspension of the uterus. “Both stitches are inserted before either is tied.” The catgut stitch embracing muscle and fascia has been tied.

been overdone because of its simplicity and the ease with which it is performed. The abdomen having been opened

and any other necessary work accomplished, two or three stitches are inserted at the lowermost angle of the median abdominal incision as follows: One stitch of silk first picks up the peritoneum on one side of the incision, then bites into the posterior surface of the uterus just below the fundus, and passes out through the peritoneum on the other side. The next stitch of catgut may include the muscle and fascia as well as the peritoneum, and both are inserted before either is tied, the tying not being done until it is certain that no loop of intestine has insinuated itself between the uterine fundus and the abdominal wall. The immediate result of the operation is a delicate layer of adhesions between the posterior surface of the fundus and the anterior parietal peritoneum. After a time these adhesions are dragged out into a thin filamentous band, which allows considerable freedom of movement of the uterus, but does not permit its complete backward displacement. The operation is contra-indicated during the child-bearing period as the fundus may be held so far anteriorly that it cannot rise with the growth of the uterus during pregnancy. Should this occur the cervix is thrown posteriorly and upward, even to or above the sacral promontory, and enlargement of the uterus proceeds by a thinning out and distension of its posterior wall rather than by uniform growth in all directions.

VENTRO-FIXATION

In distinction from the preceding operations, ventro-fixation aims at producing firm adhesions which will *not* draw out and form a third ligament, and it is used only in extreme forms of prolapse. Since the operation is usually preceded by extensive plastic work at the same sitting, the simplest effectual method for its performance should be chosen. When performed by itself, the requisite plastic procedures having been carried out at some previous time, one of the more radical operations

may be used, such as Crile's fish tail removal of the fundus and body.

The ordinary operation differs from suspension in that the uterus is drawn sufficiently well into the lower angle of the abdominal wound to permit suturing the parietal peritoneum at the margins of the incision to the uterine fundus at some dis-

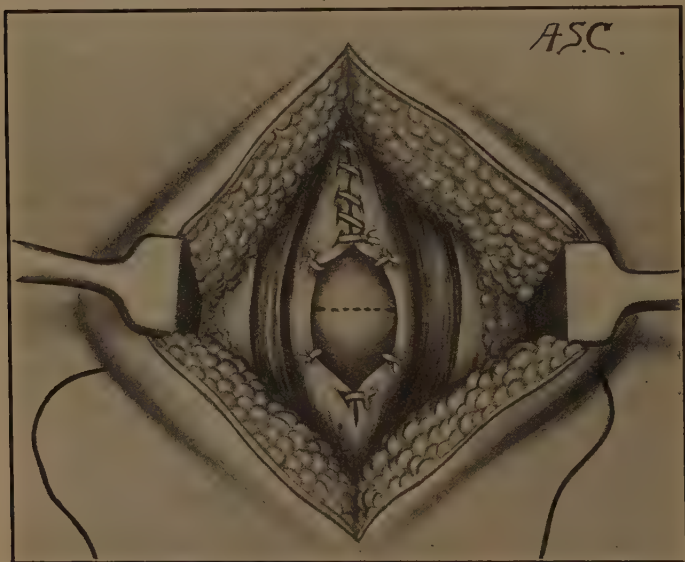


FIG. 154.—Ventre-fixation of the uterus. "The parietal peritoneum is sutured to the fundus at some distance from its middle." The fundus projects between the recti muscles.

tance from its middle. The superior mid-portion of the fundus thus projects into the abdominal incision between the recti muscles, and is included in the stitches which unite these muscles when the abdominal incision is closed. A uterus so fixed remains with its fundus permanently incorporated in the abdominal wall, but unless the pelvic diaphragm has been efficiently repaired the uterus may stretch out to a great length by reason of the constant traction exerted upon it by the pro-

lapsed bladder, and in this event the cervix again will make its appearance at the vulva.

MYOMECTOMY

Vaginal Myomectomy.—The removal of a small cervical fibroid is easily accomplished by an incision carried to its capsule through the mucous and muscular tissue overlying it. The tumor is then grasped with a volsellum forceps and peeled out of its bed by blunt dissection, and the cavity closed with buried stitches.

The removal of an intra-uterine myoma through the vagina is simple if the tumor is small and pedunculated, or if it has been sufficiently delivered by Nature's efforts to have dilated the cervix.

Large, sessile intra-uterine tumors were more frequently removed by this method in the past than at present, when the possibility of malignancy and the occurrence of multiple tumors are better understood.

Tumors which have been partially expelled from the cervix are likely to be infected or necrotic, and are better removed through the vagina than through an abdominal incision.

With the patient in the lithotomy position the final cleansing is carried out and the vagina dilated to its fullest extent. The cervix is grasped with the volsellum forceps and the relations of the tumor ascertained. Very small pedunculated tumors may be twisted off without ado. If the cervix is sufficiently dilated to permit a larger tumor to be delivered intact, it is grasped with large volsellum forceps, drawn down, and an incision made through the mucosa covering it. This incision should encircle the growth above its greatest circumference, but should *not* be made through a narrow pedicle. Traction upon the tumor is continued while the mucosa is pushed away from the capsule in all directions above the incision, and eventually it

is peeled entirely from its bed. If the proper line of cleavage is found between the fibrous capsule of the tumor and the surrounding tissue this dissection is easily accomplished. The hemorrhage is surprisingly slight and is controlled by hot irrigation and packing the bed of the tumor with iodoform gauze.

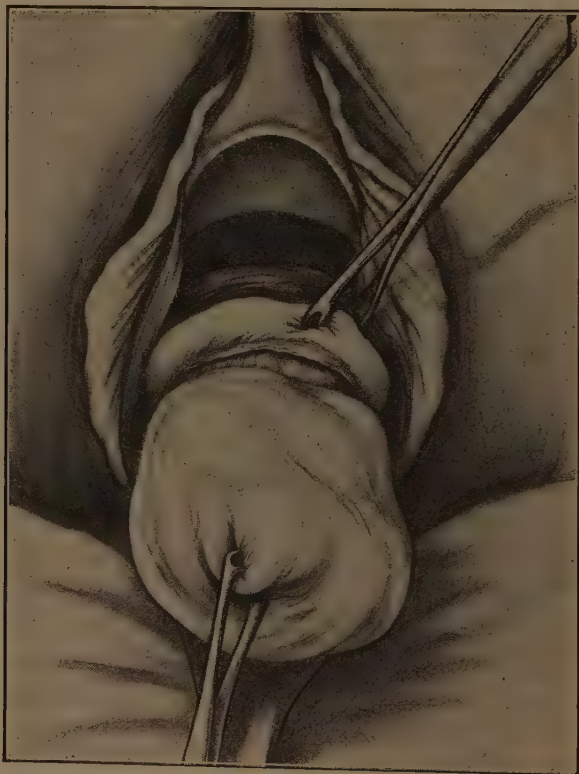


FIG. 155.—Vaginal myomectomy. The tumor is drawn down with volsella and an incision is made through the mucosa covering it. This incision encircles the tumor superior to its greatest circumference.

The removal of a tumor whose greatest circumference has not escaped from the cervix necessitates either a reduction in the size of the growth or a wider opening in the cervix.

The tumor can be reduced by the successive removal of

wedge-shaped pieces from its inferior surface. When it is sufficiently small to be delivered through the cervix, it is removed in the manner just described.

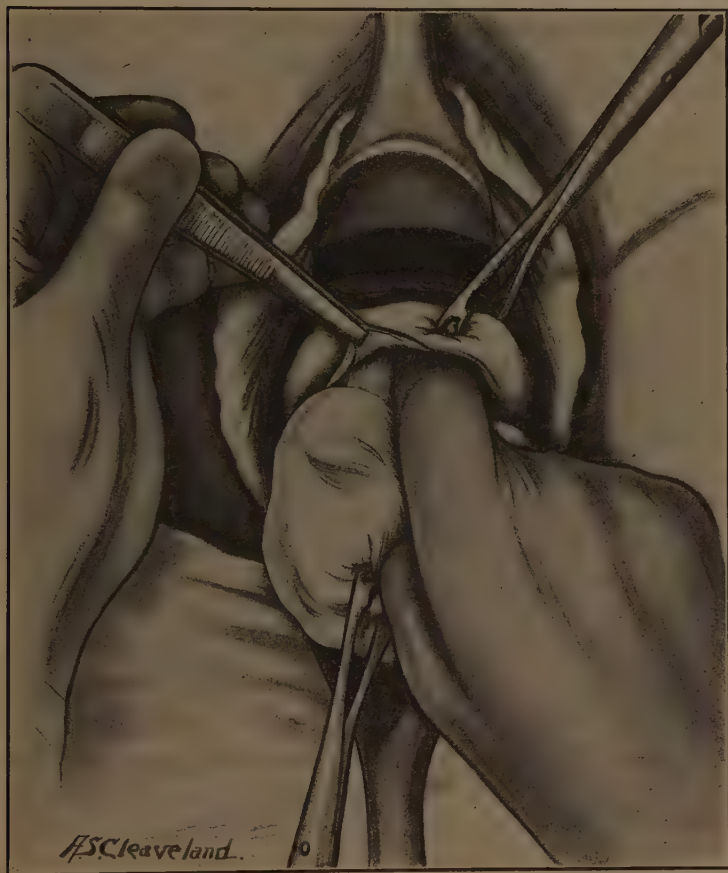


FIG. 156.—Vaginal myomectomy. "Traction upon the tumor is continued while the mucosa is pushed away from the capsule in all directions."

The cervix can be enlarged by dilatation or incision. Dilatation should be practised in the case of small growths only, while larger ones demand anterior and posterior section of the

cervix. This is performed by making a transverse incision at the junction of the cervix and vagina anteriorly and stripping the bladder from the supra-vaginal portion of the cervix. The anterior lip is then grasped by two volsella forceps, one on either side of its mid-line, and cut longitudinally between them. Due caution should be exercised that the peritoneum is not opened in the depths of the wound. The posterior lip is split in the same manner, but preliminary incision of the cervico-vaginal junction may not be necessary. The tumor is now removed and the cervical incisions sutured if the uterus is not infected, or packed if it is. If the patient is in a very serious condition from hemorrhage, nephritis, or cardio-vascular disease, it may be necessary to control hemorrhage and stimulate further dilatation of the cervix and expulsion of the tumor by repeated packing and the hypodermic use of ergot or pituitary extract.

The packing should be carried out carefully and aseptically, and ergot is preferable to the pituitary extracts for prolonged use. Once the largest circumference of the tumor is forced outside the cervix it can be removed by the operation described without anæsthesia if the general condition is too serious to justify the latter.

Removal by the snare or ecraseur is not advised as the uterus may be partially inverted by the dragging upon it of the growth, and the uterine wall may then be damaged or even perforated. It is for this reason also that incision of the mucosa surrounding the tumor is made *below* the pedicle, instead of through it, when the tumor is to be removed by blunt dissection.

ABDOMINAL MYOMECTOMY

Abdominal myomectomy has a rather circumscribed field of usefulness and is applicable only to a limited class of cases for the same reasons that apply to the vaginal operation. Even when a fibroid of considerable size seems to be solitary, other

very minute ones may be found in the uterine wall, and if only the large growth is removed these small seedlings may continue to grow and necessitate another operation later.

Abdominal myomectomy also has a slightly higher mortality rate than supra-vaginal hysterectomy. It is useful, however, in young women in whom the function of child-bearing should not be interfered with if the tumors are moderate in size and



FIG. 157.—Abdominal myomectomy. The uterine wall is incised longitudinally, the incision penetrating into the tumor in order to demonstrate to a certainty the plane of the tumor capsule.

limited in number, or if they are distinctly pedunculated. If the tumor is pedunculated its pedicle may be excised close up against the uterine wall, the bleeding controlled by deep catgut sutures, and neighboring peritoneum drawn over the raw area by means of Lembert sutures. If the tumor is sessile or interstitial, the wall of the uterus over the most prominent

portion of the tumor should be incised in the longitudinal axis of the uterus until the tumor is reached. Berkley and Bonney advise that in making this incision the knife penetrate a short distance into the tumor, the object being to give one an idea as to the exact location of its true capsule. When the capsule is demonstrated the overlying uterine wall may be separated from it by blunt dissection, bleeding being controlled by upward traction upon the uterus, or if hemorrhage is excessive, by having an assistant control the ovarian and uterine arteries by grasping the broad ligaments with the hands. The tumor shells out with little difficulty if the line of cleavage between the capsule and uterine wall is accurately ascertained. The cavity left after extirpation of the tumor should be closed by deep catgut sutures which encircle all bleeding points. If the tumor is more than a mere knob on the surface of the uterus, several layers of sutures will be needed to completely occlude this cavity, after which the peritoneum is drawn over the incision by means of Lembert stitches. All vessels should be controlled and dead spaces completely obliterated, but excessively tight sutures must be avoided or sloughing may be induced and a perforation take place between the uterine and abdominal cavities. Great mutilation of the uterine wall by the removal from it of a large number of sessile growths is not justifiable in consideration of the smooth convalescence and low mortality rate of supra-vaginal hysterectomy.

HYSTERECTOMY

Supra-vaginal Hysterectomy.—The sub-total hysterectomy of English writers is an operation of distinctly modern development, and so far as technique is concerned it would seem as if perfection had been reached. Variations from the typical operation are required when growths expand the broad ligament, large tumors develop within the cervical canal, or arise in the wall of the cervix and project under the bladder an-

teriorly or under the peritoneum posteriorly. Very dense adhesions also may render the typical operation more dangerous than one of its modifications.

In ordinary instances of hysterectomy for fibroids, for tubo-ovarian disease with marked uterine infection, and for intractable hemorrhage, as well as in hysterectomy following Cesarean section, the typical operation leaves nothing to be desired in the way of trivial post-operative discomfort, smooth convalescence, and ultimate recovery. The abdomen is opened by an incision sufficiently large to allow thorough exposure of the field of operation, and any visible adhesions are separated so that the uterus and tumor may be drawn out of the abdominal cavity. Dense adhesions which lie deep in the pelvic cavity under the tumor should not be separated until they can be seen, as injury to veins in this locality may result in severe hemorrhage which cannot be controlled until the uterus is removed. If the patient is very stout or the uterus small, it may be impossible to draw it through the abdominal incision, and in this event it is pulled up as far as possible with volsellum forceps and drawn from side to side until the landmarks can be ascertained. These landmarks are the tops of the broad ligaments and the round ligaments lateral to the uterus, the sacro-uterine ligaments posteriorly, and the utero-vesical ligaments anteriorly. The first step in the actual removal of the uterus is to apply clamps to the top of each broad ligament. These clamps are intended to control the ovarian vessels, and the exact site for their application depends upon whether or no the ovaries and tubes are to be removed with the uterus. If they are, the clamps should be applied between the ovary and the pelvic wall and should extend down a sufficient distance to control both the ovarian artery and ovarian veins. Another clamp should be placed on each broad ligament well in toward the lateral wall of the uterus so as to prevent regurgitation of blood from the tumor when the broad ligaments are cut. The round ligament may be included in the first clamp unless the top of the broad ligament is very

much expanded by the growth, in which event a separate clamp must be used for this purpose. Having secured the ovarian vessels and the vessels of the round ligament, the top of the broad ligament is cut on each side far enough from the clamp which controls the ovarian vessels to obviate retraction of the stump. The round ligament on each side is now cut on the median side of its clamp, hemorrhage from the artery in its

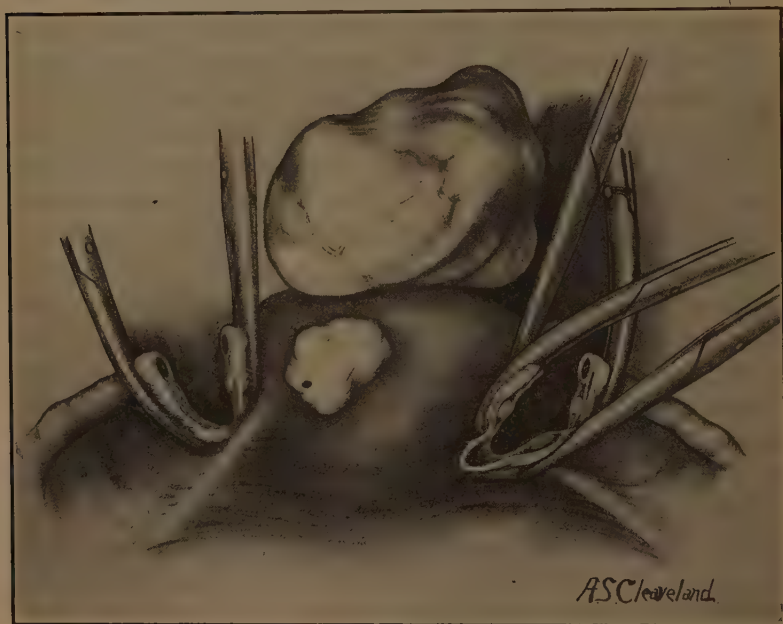


FIG. 158.—Supra-vaginal hysterectomy. Anterior view. Top of right broad ligament clamped and cut between clamps. Top of left broad ligament and round ligament clamped and cut between clamps.

uterine end being controlled by the clamp on the broad ligament at the lateral wall of the uterus.

Separation of the vesico-uterine fold of peritoneum is next in order. This may be done by first cutting a peritoneal flap with the knife, or better by inserting a finger under the anterior layer of broad ligament where this has been severed as just

described. Pushing the finger or a blunt dissector under this fold of peritoneum lifts it from its attachments to the supra-vaginal cervix approximately one-half across its anterior face. Repetition of this maneuver upon the other side frees the peritoneum at the utero-vesical junction, and the scissors may then be used to cut the peritoneal flap making it of any length which the exigencies of the case demand. Having turned this flap

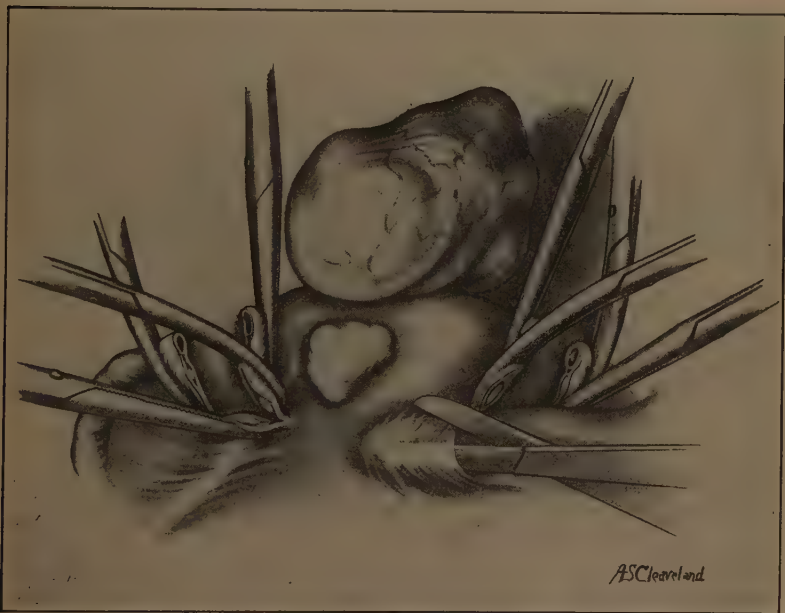


FIG. 159.—Supra-vaginal hysterectomy. Cutting peritoneum at utero-vesical junction. Finger or blunt dissector first raises flap which is then cut with scissors.

downward, the bladder is pushed off from the anterior cervical wall with a gauze covered finger, the blunt dissection extending well out at either side in order to crowd the ureters farther away from the cervix. The tops of the broad ligaments, the round ligaments, and the anterior peritoneal flap having been cut, the uterus may now be drawn much farther out of the abdominal cavity. A moment's search will usually reveal the uterine

vessels immediately adjacent to the antero-lateral wall of the supra-vaginal cervix. It will be remembered that each uterine artery runs inward through the base of the broad ligament, crosses the ureter, and *then* turns up along the lateral uterine wall. The proper location for the clamps to be so placed upon the artery as not to endanger the ureter is easily ascertained. When the clamps are applied at right angles to the uterus with

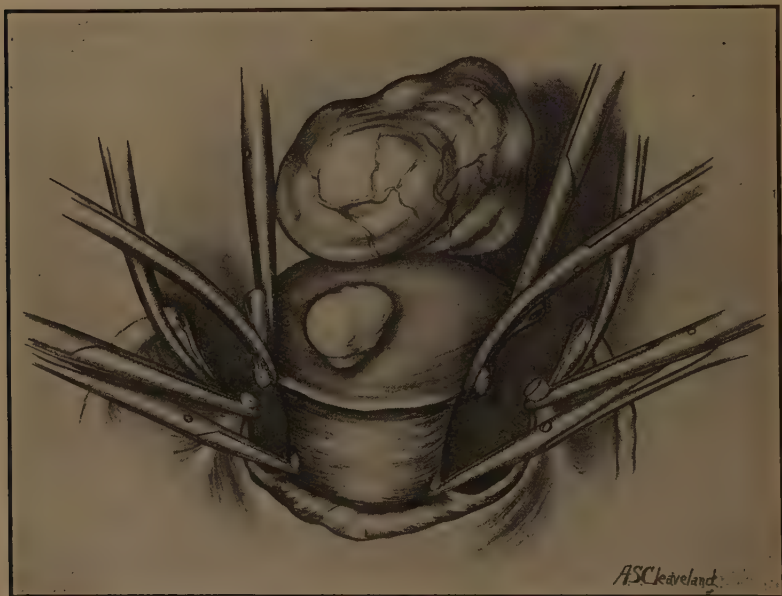


FIG. 160.—Supra-vaginal hysterectomy. The bladder has been pushed down from the supra-vaginal cervix by blunt dissection. The uterine arteries are clamped *after* they turn upward along the cervix.

the points grasping the vessel superior to its upward turn, injury to the ureter is impossible. The posterior layers of the broad ligaments are now snipped with scissors down to the level of the clamps upon the uterine vessels, when the body of the uterus will be found to have lost all its attachments excepting that to the cervix. Regurgitation from the uterine end of any vessels should be controlled by clamping, for while such

blood is already lost to the patient it obscures the field and endangers the safety and neatness of the operation.

The cervix is now cut across with knife or scissors in such manner as to leave a V- or cup-shaped depression in its center. Traction upon the uterine body while the cervix is being severed assists materially in producing this depression which makes suturing of the stump much easier. Bleeding vessels upon the

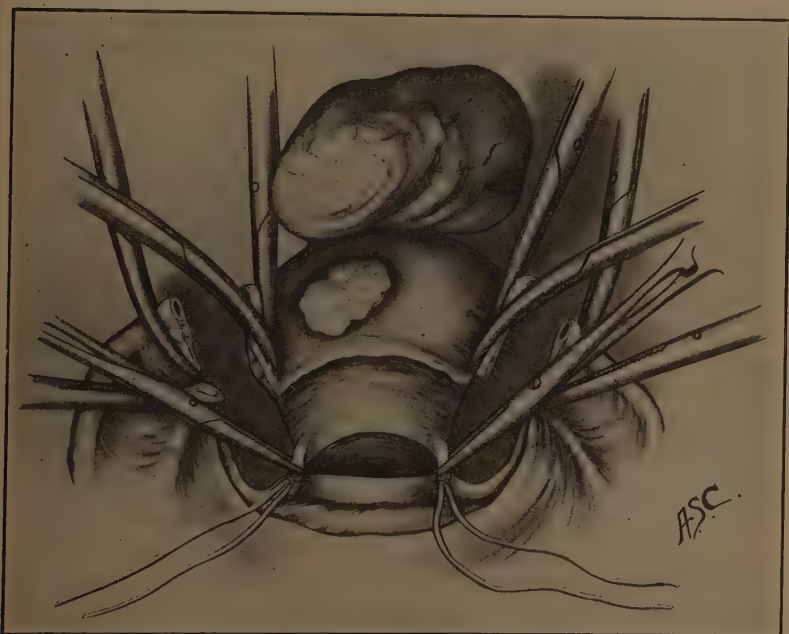


FIG. 161.—Supra-vaginal hysterectomy. The cervix has been partially severed from before backward. Ligatures are shown on the uterine vessels. Ordinarily these are placed and tied after the cervix is completely severed.

anterior or posterior walls of the cervix, or any branches of the uterine which may have escaped the clamps are caught as they are divided. When the cervix has been cut partially across, its stump is caught with a volsellum in order that it may not drop out of sight when completely detached. The cervical canal is then closed by a single mattress stitch and three or four ad-

ditional interrupted stitches close the remainder of the stump. Interrupted sutures are preferred to continuous as they offer less opportunity for pressure necrosis and possible gangrene of the stump. Any vessels which may have been picked up in the stump should be included in these stitches, and if one or two strings are left long they may be used to manipulate the stump when the volsellum is removed. The tissue in the clamps which control the ovarian vessels should now be tied. As the first

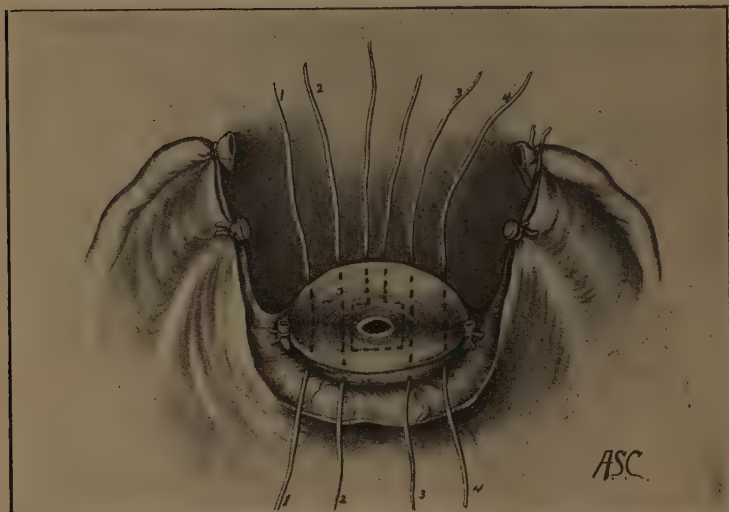


FIG. 162.—Supra-vaginal hysterectomy. A mattress stitch has been placed to close the cervical canal. Interrupted stitches in place to close the cervical flaps. Clamps on ovarian vessels and tubes, round ligaments, and uterine arteries have been supplanted by ligatures.

turn of the knot is being drawn taut the clamp is loosened, but not entirely removed until it is definitely ascertained that the ligature will not break. The uterine arteries are best tied with a suture ligature which bites into the cervical wall immediately below the point of the clamp. If the ureters are known to be safe, silk or chromic catgut may be used on the uterine arteries, but if for any reason the exact location of the ureters is unknown plain catgut had best be used and reinforced by a tie upon the

uterine artery as it projects from the mass of tissue included in the ligature. The stump of the round ligament is now tied unless it already has been included. If there is any question concerning the security of the ligature upon any one of the four cardinal vessels it should be re-tied at once, and no chance be taken that oozing *may* stop or a ligature *may* hold. When hemostasis is assured the entire raw surface is covered over as

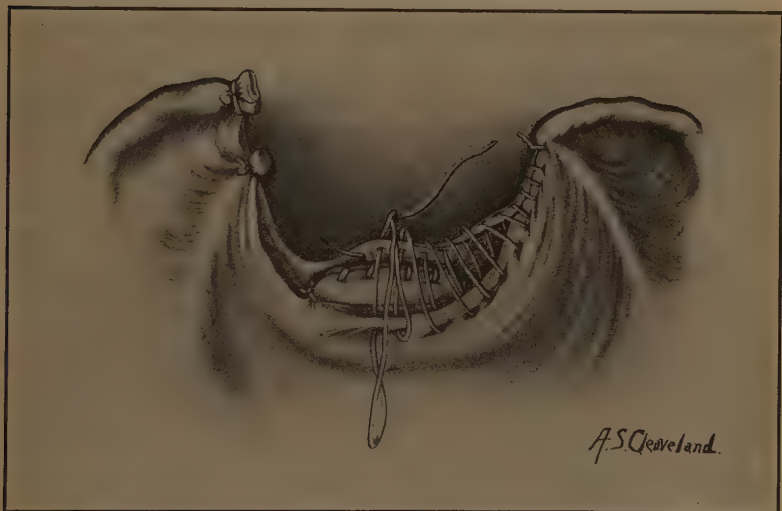


FIG. 163.—Supra-vaginal hysterectomy. The cervical stump has been closed. A continuous stitch covers over all raw surfaces.

follows: With a small needle and fine catgut a suture is started just external to the stump of one ovarian artery which whips together the peritoneum forming the anterior and posterior folds of the broad ligament, inverting any raw areas as they appear. When this suture has arrived at the lateral wall of the uterus the flap of peritoneum attached to the bladder is sewn to the posterior peritoneal-covered surface of the cervix by a series of Lembert stitches, and from the opposite lateral wall the suture is then continued on the opposite broad ligament until it ends beyond the ligature upon the ovarian stump of that side. All

raw areas, including the cervical stump, are thus covered by peritoneum, and if the work has been done neatly the bottom of the pelvic cavity presents a dry, smooth appearance with no denuded surface. Any blood is now removed from the bottom of the pelvic basin or pubo-vesical excavation by means of a sponge wet in saline solution, the surfaces are gently dried, and the abdomen closed without drainage.

Special Points in Technique.—1. A moderate Trendelenburg position is of assistance during the separation of such adhesions as need the aid of sight as well as touch. The extreme Trendelenburg position is rarely required and should not be used unless necessary.

2. In separating adhesions care must be taken that they are stripped from the structures to be removed rather than from the viscera.

3. One should be very circumspect while separating adhesions which are hidden underneath a tumor. The veins in this locality are large and any injury done to them in the depths of the pelvis cannot be corrected until the tumor is out of the way.

4. Time consumed in placing pads and sponges in such a manner as to thoroughly wall off the entire abdominal cavity above the pelvic structures is time well spent, as it keeps the field free from intestine, avoids soiling, and prevents shock.

5. If a clamp slips from a primary vessel, or if that vessel has not been included in the clamp designed to hold it, the operator should not grasp at it blindly as by so doing the gut, the bladder, or the ureter may be seriously damaged. The few ounces of blood which may be lost in the moment or two required to accurately locate the bleeding vessel is of slight importance compared to damaged viscera or a clamped ureter.

6. At that stage of the operation in which the cervical canal is cut across, its uterine end should be covered with a gauze sponge to prevent the possible entrance of material from the body of the uterus. While this ordinarily is sterile, breaking down polypi or even beginning carcinoma may be present and

the discharge from these may contain virulent micro-organisms. It does no harm, and may be judicious, to sterilize the exposed mucosa in the cervical stump by the application of pure carbolic acid, any excess being neutralized with alcohol.

OPERATIVE MODIFICATIONS FOR UNUSUAL CONDITIONS

As before mentioned, certain cases present themselves in which the foregoing technique for supra-vaginal amputation of the

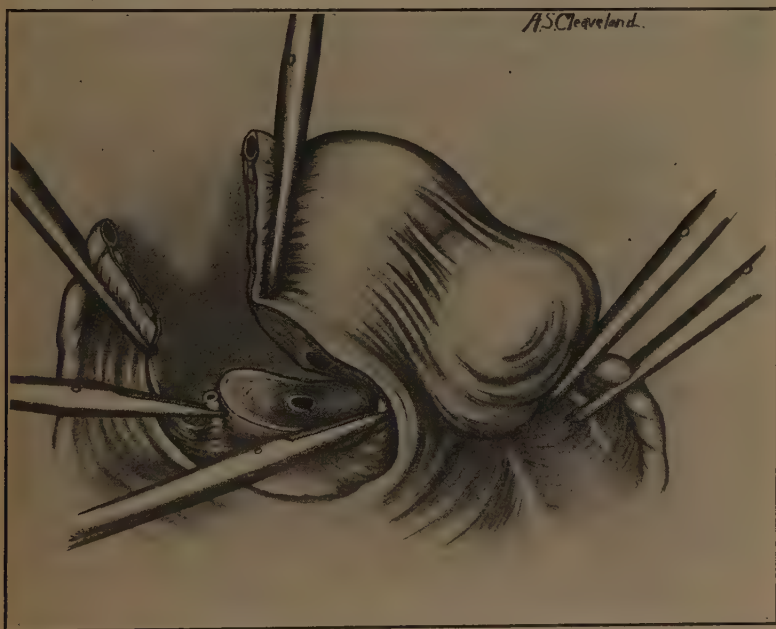


FIG. 164.—Supra-vaginal hysterectomy from side to side. The uterine vessels on the diseased side are caught by a clamp "which crosses the stump of the cervix transversely."

uterus is impracticable. A tumor which originates low in the cervix and grows between the layers of the broad ligament may elevate the ureter over it, and if in such a case the ordinary technique were followed, injury to the ureter could not be

avoided. When it is found that a fibroid which grows from the lateral wall of the uterus is contained between the anterior and posterior folds of the broad ligament, the operation should proceed as before up to the point where only the uterine arteries remain to be controlled; that is, the ovarian vessels may be clamped on both sides, the round ligaments clamped or tied,

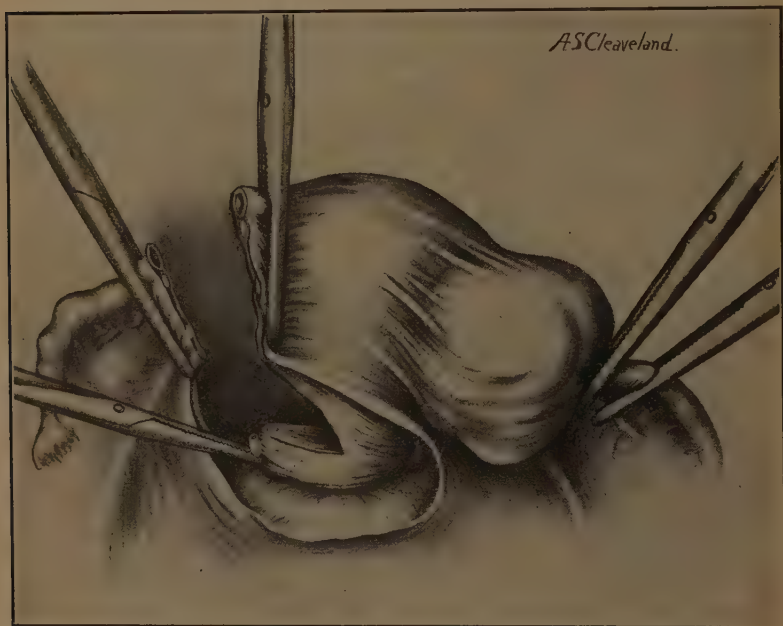


FIG. 165.—Supra-vaginal hysterectomy for fibroid growing into left broad ligament. Side-to-side amputation of uterus.

and the anterior flap of peritoneum cut. The broad ligament on the side *opposite* the tumor is then severed to the level of the uterine artery, the uterine vessels on the same side caught, and the uterus amputated from the cervix before securing the uterine vessels on the side which contains the tumor. As the cervix is cut across the vessels in the stump should be secured and the tumor rolled out by traction upon the uterus, when the uterine

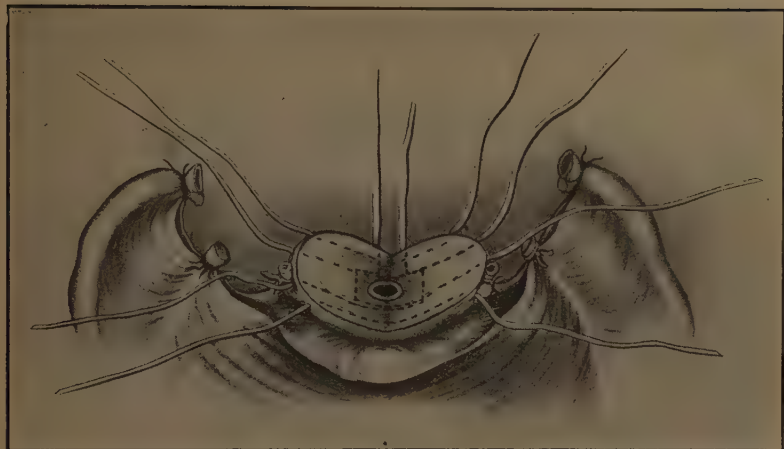


FIG. 166.—Supra-vaginal hysterectomy from side to side. Uterus removed, stitch for occlusion of cervical canal is placed. The cervix is to be closed from side to side.

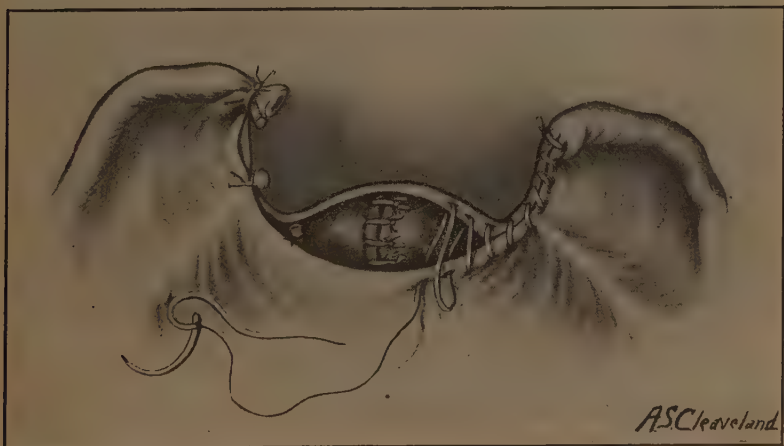


FIG. 167.—Supra-vaginal hysterectomy from side to side. Cervix closed. Raw areas in process of closing as in usual operation.

artery on the diseased side will be exposed and should be caught by a clamp which crosses the stump of the cervix transversely and grasps the vessel as the final stroke of the knife severs the last

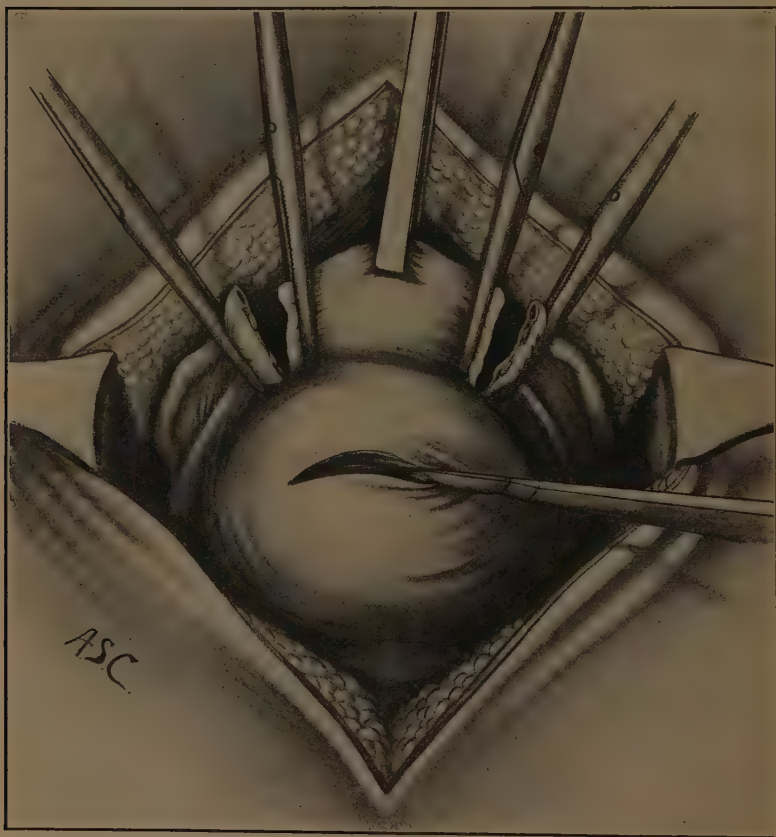


FIG. 168.—Supra-vaginal hysterectomy for fibroid expanding the cervix. The tops of the broad ligaments have been clamped and cut. A short cut is made in "the anterior cervical wall through which a line of cleavage is found between the muscular tissue of the cervix and the capsule of the tumor."

bit of muscular tissue. The tumor can now be drawn from its bed in the broad ligament by working from below upward, and if the ureter has not been displaced by the tumor it will not be

seen. If it has been displaced, it will be observed and brushed off into the connective tissue of the broad ligament without injury.

When a large growth projects from the cervix underneath the bladder it can be attacked as recommended by Murphy. The

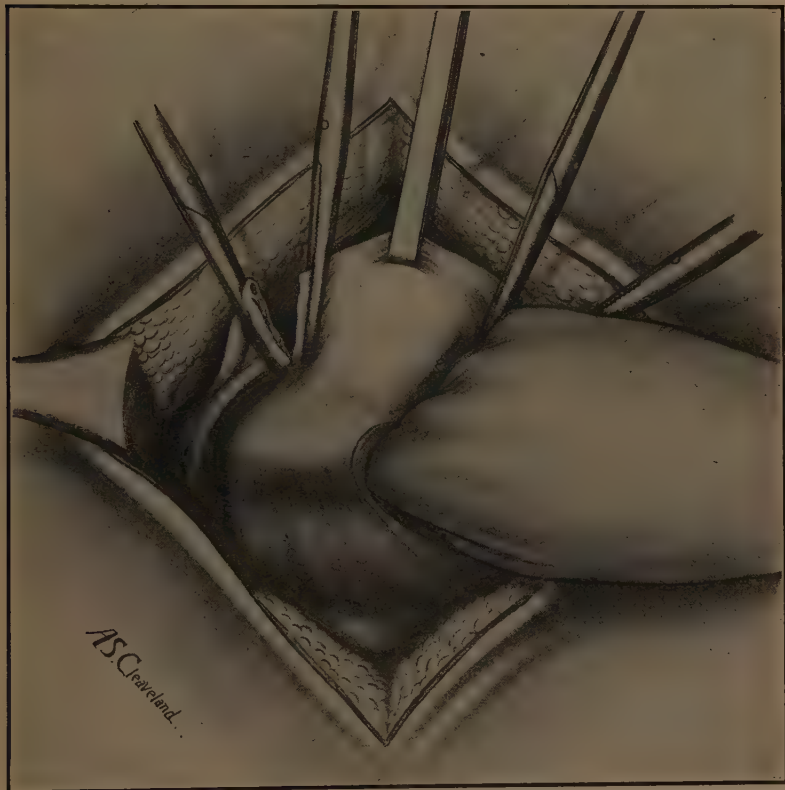


FIG. 169.—Supra-vaginal hysterectomy for fibroid expanding the cervix. The finger is separating the tumor from its envelope of cervical muscle.

tops of the broad ligaments and the round ligaments are secured and cut as before, and the cervico-uterine junction is then severed from behind *forward*, cutting only in the muscular tissue of the cervix. Traction is made upon the uterus and the uterine vessels are exposed at either side of the cervix and are there

clamped and cut. By drawing the uterus and tumor over the pubes they can be rolled out of their connective tissue bed until the bladder wall is reached, when this is gradually peeled from the tumor by blunt dissection, the final step being the fashioning of the anterior peritoneal flap from below.

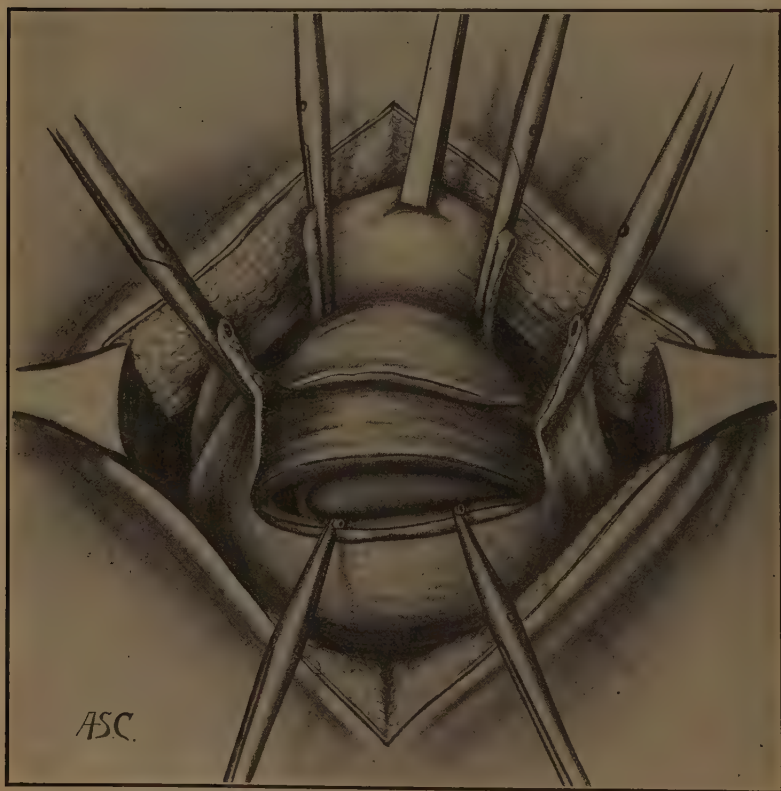


FIG. 170.—Supra-vaginal hysterectomy for fibroid expanding the cervix. The tumor has been loosened by blunt dissection. The anterior cervical wall has been cut transversely and small vessels caught.

Tumors which grow into the interior of the cervix, expanding its wall around them and attaining a great size, present very serious difficulties. In their removal the operation should

proceed in the typical fashion through the stages of clamping and cutting the tops of the broad and round ligaments. After these preliminary steps have been taken, the bladder beneath the anterior peritoneal flap is pushed down to the top of the

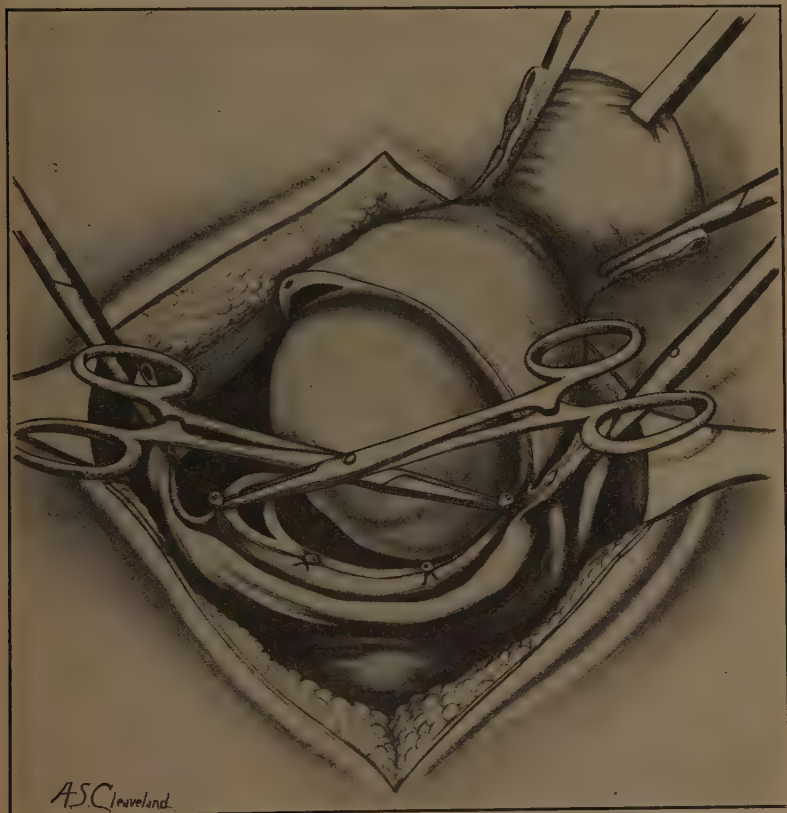


FIG. 171.—Supra-vaginal hysterectomy for fibroid expanding the cervix. The tumor is being rolled from its bed. The uterine arteries are clamped from *within outward*.

vagina. No attempt to control the uterine vessels on either side is made at this stage since the immediate proximity of the ureters makes their injury almost certain. Owing to the expansion of the cervix by the growth of the tumor in its in-

terior, the cervical wall forms a thin muscular capsule external to the true tumor capsule, and the tumor itself should be enucleated from this muscular capsule before any attempt is made at removal of the uterus. This is accomplished by making

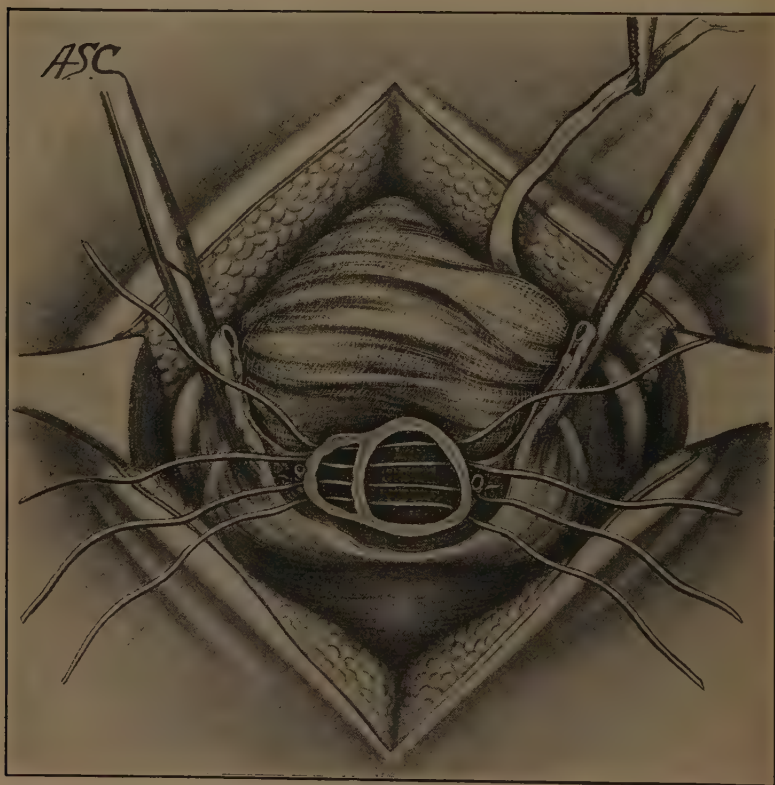


FIG. 172.—Supra-vaginal hysterectomy for fibroid expanding the cervix. The tumor has been removed and the uterine vessels tied. Sutures laid to close the cervical canal and tumor bed.

a short cut in the anterior cervical wall through which a line of cleavage is found between the muscular tissue of the cervix and the capsule of the tumor. The finger is then inserted through this incision and the entire growth separated from the interior of the cervix by blunt dissection along the line of

cleavage. The incision in the anterior cervical wall is then enlarged, the tumor withdrawn from the interior of the cavity, and the uterine vessels caught at the sides of the now collapsed cervix. If bleeding from the cavity is free and the main vessels are not readily located, the entire uterus may be amputated at the level of the original cut, clamping the small arteries in the stump as they spurt, when the primary vessels at the sides of the cervix can be secured without difficulty. The clamps which catch the uterine vessels should be directed from within outward across the stump, rather than from without inward, in order to avoid the ureters which are in close proximity to the cervix and antero-lateral walls of the vagina.

PAN-HYSTERECTOMY

Pan-hysterectomy may be performed when a severe laceration of the cervix co-exists with any condition demanding removal of the body of the uterus. It is the operation of choice for carcinoma of the body and fundus, and is sometimes performed for very early cervical carcinoma. Because of the frequent association of malignancy with fibroids of the uterus, some authors advise pan-hysterectomy instead of supra-vaginal amputation in all cases of the latter disease. Inasmuch as the mortality rate for pan-hysterectomy is at least double that for supra-vaginal amputation, the latter advice seems somewhat too radical.

The technique of complete hysterectomy is rendered less difficult by severing the cervico-vaginal junction through the vagina before the abdominal portion of the operation is begun. The advantage gained in this way is not sufficient to justify its adoption as a routine measure, but if a cystocele or relaxed vaginal outlet needs correction it may be well to precede the required plastic work by this incision. In case the operation is performed entirely from above the technique is the same as for supra-vaginal amputation up to the point of severing

the body of the uterus from the cervix. A very simple method of completing the operation consists in amputating the uterus and then dissecting the cervical stump from its attachments to the broad ligaments and vagina. Usually, however, it is better to proceed without separate removal of the body of the

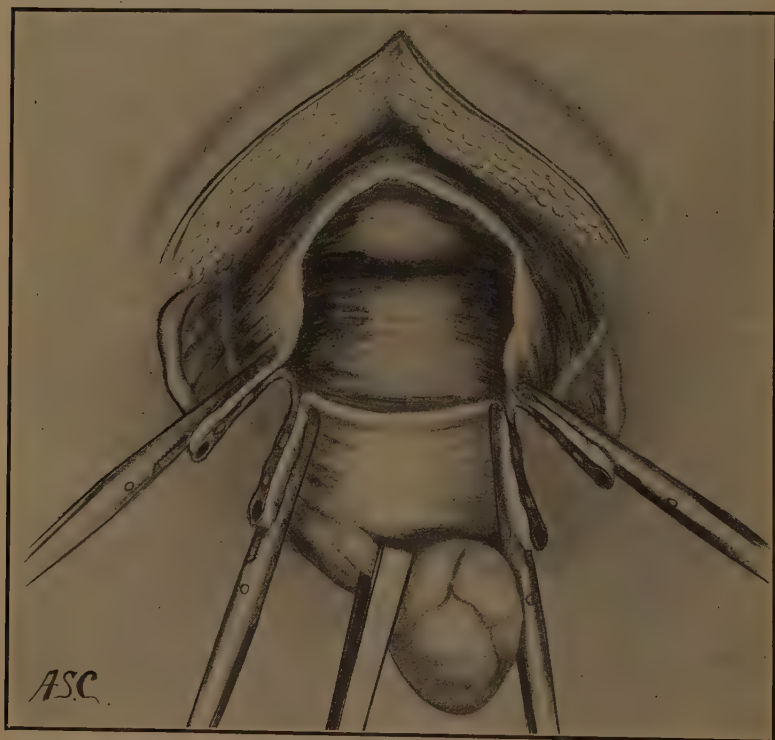


FIG. 173.—Pan-hysterectomy. Anterior view. The tops of the broad ligaments clamped and cut. The bladder is stripped from the cervix and upper portion of the vagina.

uterus, and strip the bladder from the entire anterior cervical wall and upper portion of the vagina. The uterus is drawn well forward over the pubes and the sacro-uterine ligaments noted. These ligaments and the peritoneum between them are severed transversely, and the connective tissue separating

the peritoneum from the posterior vaginal wall is picked up and cut across, the incision extending into the vagina if this has not been done from below. Two fingers are now introduced into the vagina through this opening, passed anteriorly beneath the cervix, and made to impinge upon the anterior vaginal wall between the bladder and the cervix, when a transverse incision

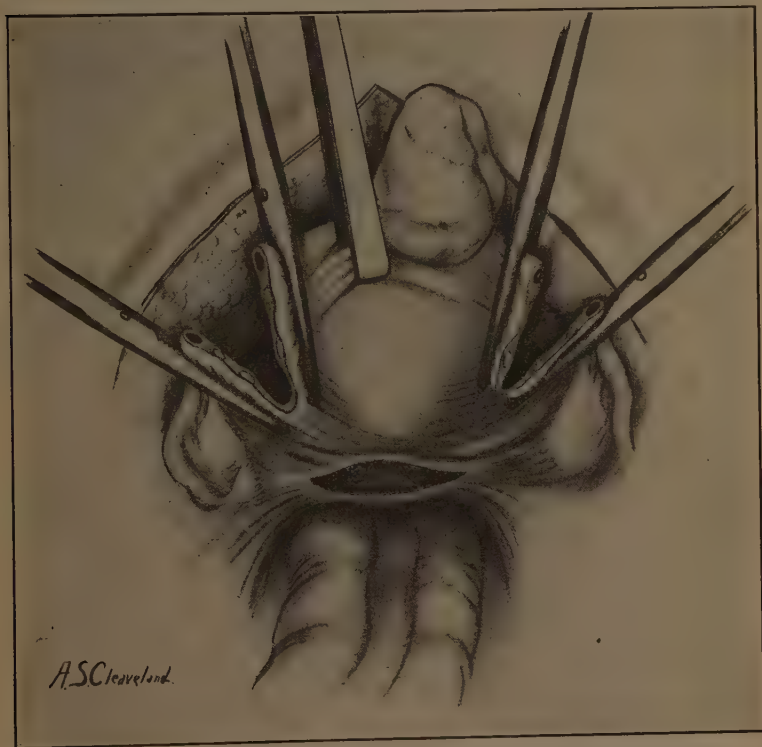


FIG. 174.—Pan-hysterectomy. Posterior view. Transverse incision through recto-uterine excavation, the incision extending into the vagina.

through this wall can be made without endangering the bladder. The uterus is now suspended solely by its lateral attachments to the bases of the broad ligaments, and it is entirely freed when these lateral strips of tissue are clamped with narrow-bladed forceps and cut between the forceps and cervix.

It is understood that vessels in the severed vaginal wall are caught as they bleed.

Permanent hemostasis is now effected by ligatures placed upon all the clamped tissue, those which secure the broad ligaments being placed close to the clamps in order to avoid the

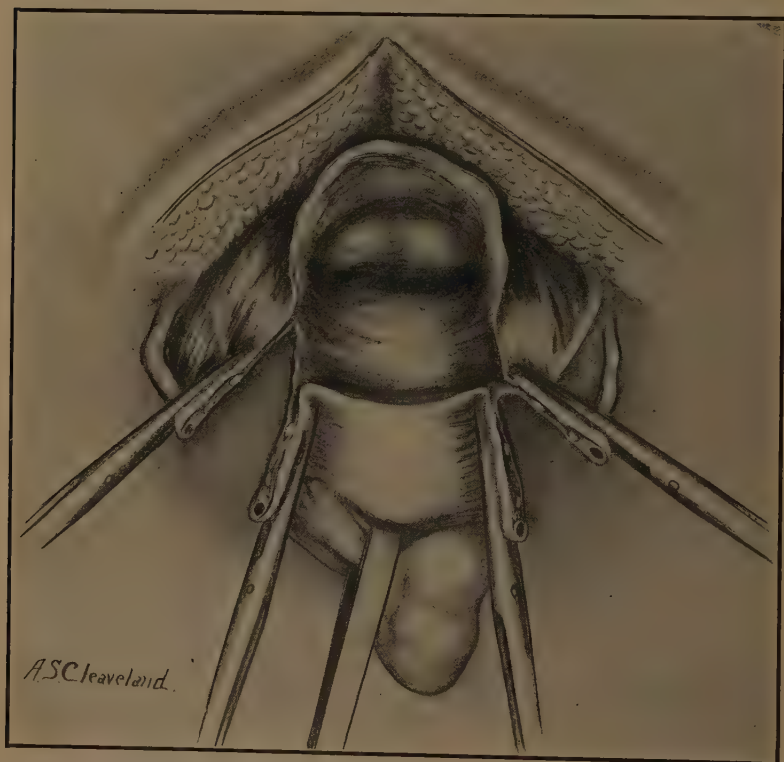


FIG. 175.—Pan-hysterectomy. Anterior view. Two fingers have been passed through the posterior incision just shown. The tips of the fingers are pushing against the anterior vaginal wall to show point for anterior incision.

ureters. The lumen of the opening into the vagina may be narrowed by suturing each lateral angle, but the vagina should not be entirely closed as a mild grade of infection of the opened connective-tissue spaces is fairly frequent. Drainage of these

areas may be secured by a cigarette drain or gauze wick which projects into the vagina through the opening in its vault.

The peritoneum covering the bottom of the pelvic cavity is then sutured as in supra-vaginal amputation, excepting that

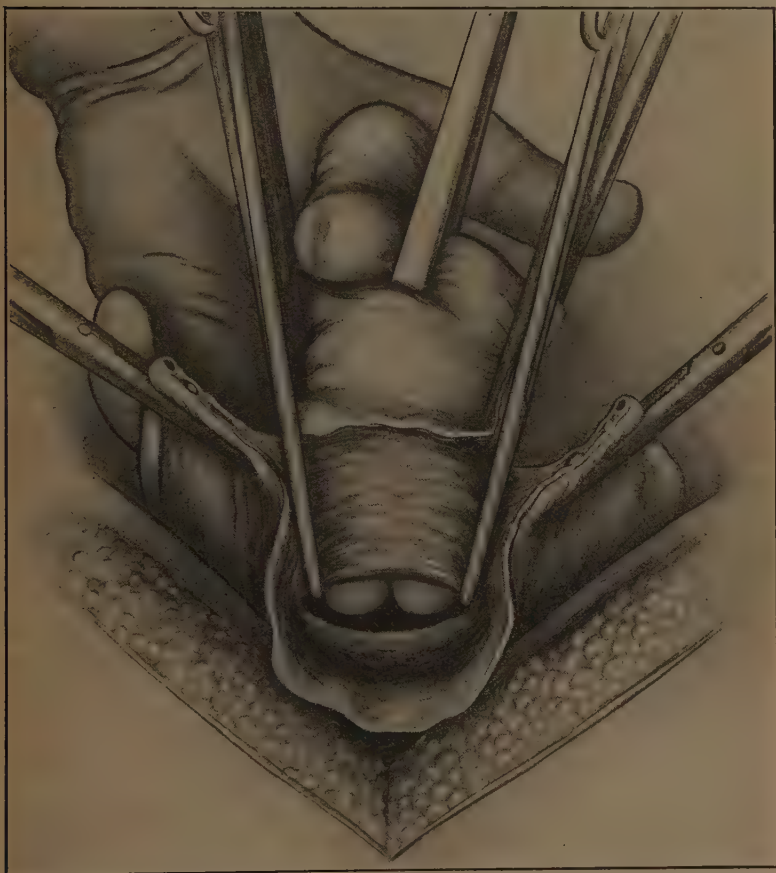


FIG. 176.—Pan-hysterectomy. Anterior view. "The uterus is suspended solely by its lateral attachments to the bases of the broad ligaments." "These strips of tissue are clamped with narrow-bladed forceps."

the peritoneal flap depending from the posterior wall of the bladder is sutured to that made by incising the recto-uterine excavation. The abdomen is closed without drainage in the

absence of sepsis or malignant disease, and if drainage is required it should be effected through the vaginal vault rather than the abdominal incision.

While many other methods of removing the entire uterus have been practised, the two above described fulfill all the indications for pan-hysterectomy for benign disease.

PAN-HYSTERECTOMY FOR CARCINOMA OF THE CERVIX

The profession is largely indebted to Wertheim of Vienna and Ries of Chicago for the inauguration of an amplified method for removing the entire uterus for malignant disease of the cervix, and no description of the operation excels that given by Wertheim in *Surgery, Gynæcology and Obstetrics* for January, 1907.

The following important principles should be emphasized:

1. To go as wide of the diseased cervix as possible in those structures where extension is first to be apprehended. These structures are the parametrium and the vaginal wall.
2. To consider the carcinomatous cervix as inevitably and dangerously infected and so to handle it as to minimize the danger both from implantation metastases and peritonitis.

To these some would add a third—to remove the regional lymphatics—but aside from its academic interest this does not seem to be of any practical importance as lymphatic involvement usually means early recurrence.

The salient points in the operation are as follows: Immediately preceding the abdominal operation the cervix should be thoroughly cauterized. It is sometimes advised that this be done a few days before the chief operation, but the sloughs and granulating surface left after this lapse of time must be more dangerous from the standpoint of infection than the cervix thoroughly cauterized immediately before opening the abdomen. The vagina should be mopped out with full-strength

tincture of iodine at the close of the vaginal portion of the operation.



FIG. 177.—Pan-hysterectomy. (*Wertheim.*) “By dividing the posterior layer of the broad ligament the ureters are exposed up to their entrance into the parametrium.”

Gloves, instruments, drapes, and gowns all should be carefully changed before the abdominal operation is begun.

The patient is elevated into the Trendelenburg position before

the abdomen is opened, and as soon as the incision is made the intestine is packed away above the pelvic brim. This packing should be done most carefully so that nothing remains in the



FIG. 178.—Pan-hysterectomy. (*Wertheim.*) "After dividing the peritoneum the bladder must be separated from the uterus."

pelvic cavity but the fixed viscera. The suitability of the case for radical operation is next determined, as it is impossible to be certain before the abdomen is opened whether radical

extirpation offers a sufficient hope of permanent cure to justify the risk. *The earlier the case the more justification for an extensive operation.*

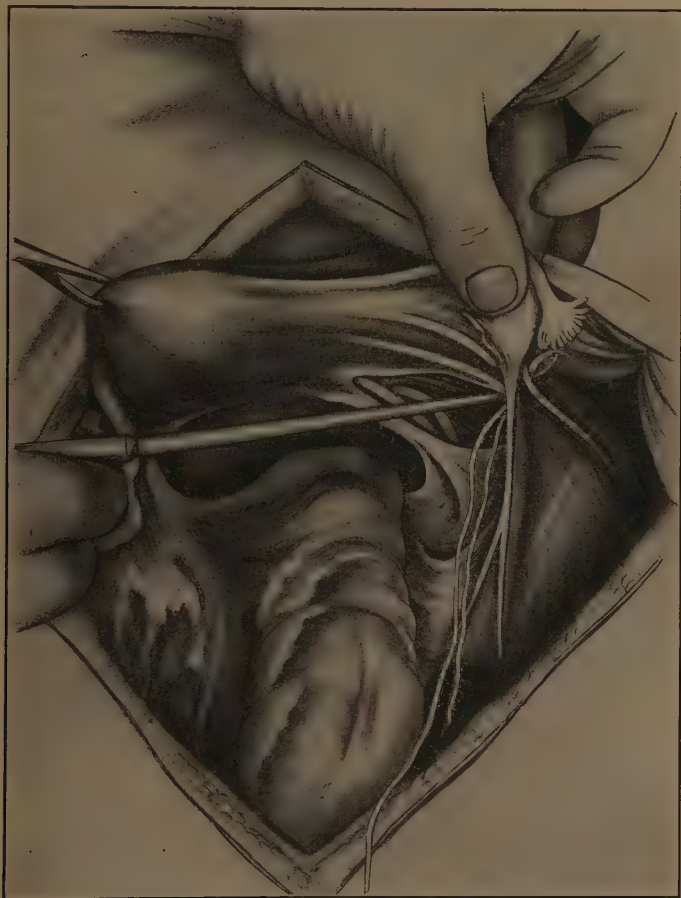


FIG. 179.—Pan-hysterectomy. (Wertheim.) "Then follow the ligation and division of the infundibulo-pelvic ligament."

If the bladder and rectum are not involved and the parametrium and ureters are free from palpable disease, the case is suitable for the most widespread dissection.

The upper portions of the broad ligaments are clamped and cut well out toward the pelvic wall. The anterior flap of peritoneum is cut, and the bladder bluntly dissected from the cervix

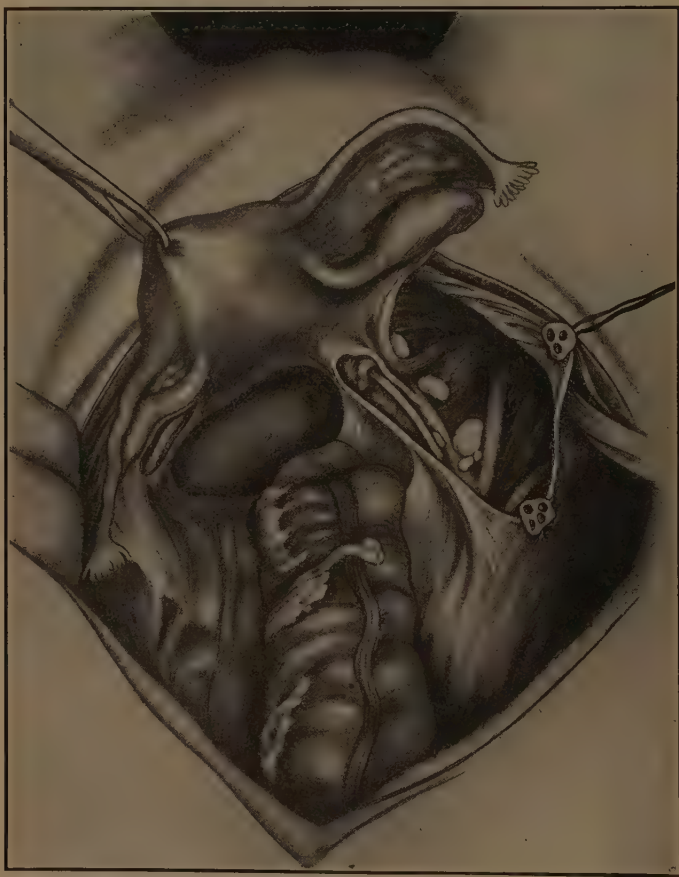


FIG. 180.—Pan-hysterectomy. (*Wertheim.*) "The broad and round ligaments."

and upper one-third of the anterior vaginal wall. The uterus is drawn forward and the ureters are demonstrated and uncovered, but *not* dissected from their bed. This may be accomplished by longitudinally incising the peritoneum at the

bifurcation of the common iliac arteries on either side. On raising the peritoneum the ureter will be found adherent to its posterior surface just to one or the other side of the incision

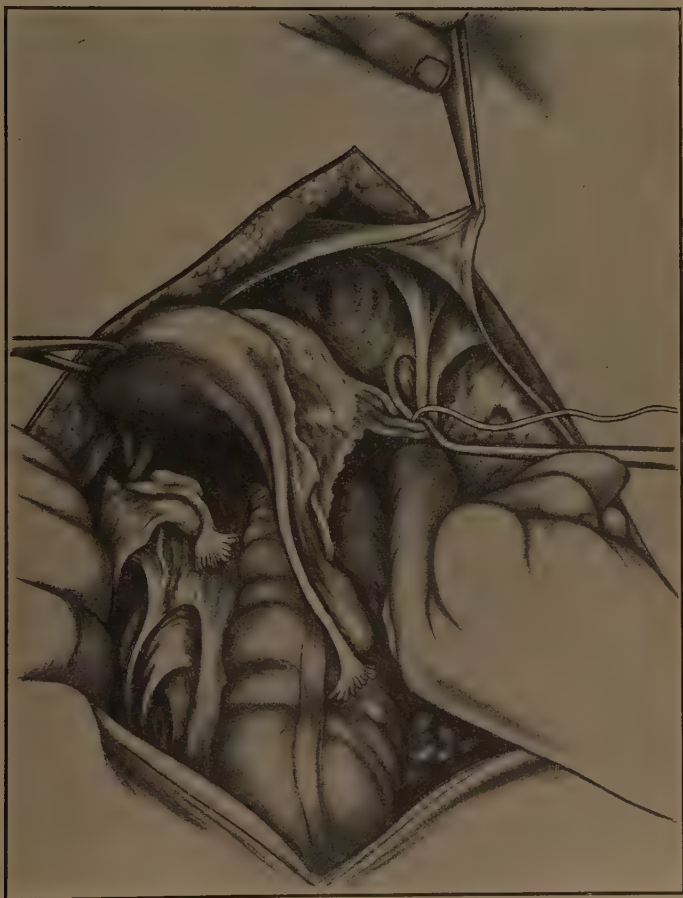


FIG. 181.—Pan-hysterectomy. (*Wertheim*.) "The index finger of one hand is pushed along the ureter through the parametrium. The vessels are then raised on the finger."

which is now extended over the course of the ureter to the point at which it is crossed by the uterine artery, and that

vessel together with the broad-ligament base is clamped *external* to the ureter. Both arteries being controlled, the broad-ligament bases are cut downward and inward toward the

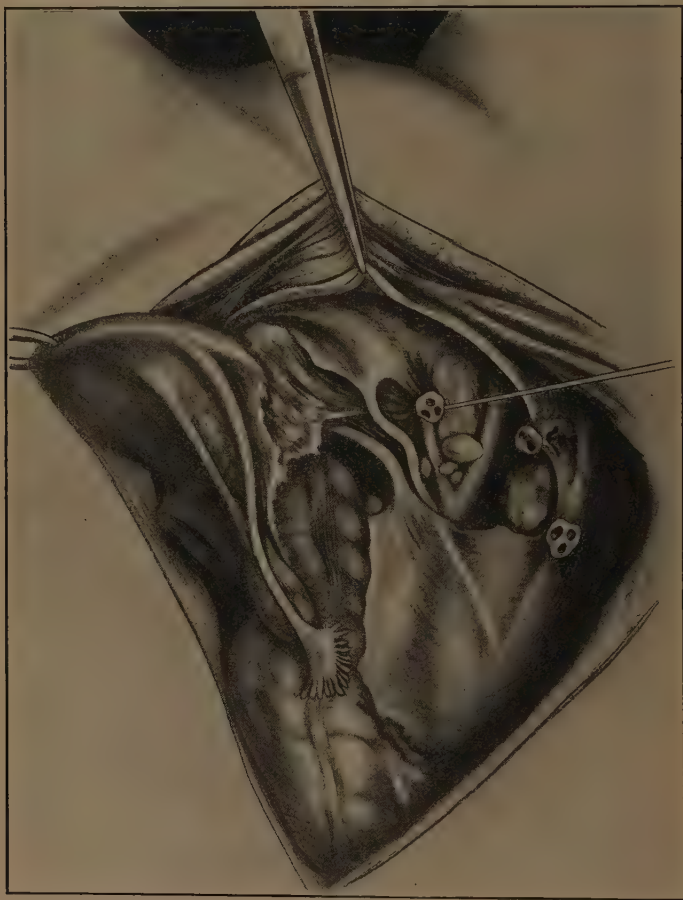


FIG. 182.—Pan-hysterectomy. (*Wertheim.*) "So that the ligation and division of the vessels can take place without injury to the ureter."

lateral vaginal walls, and the sacro-uterine ligaments are treated in the same manner. The peritoneum of the recto-uterine excavation is cut transversely, and the rectum and vagina

separated downward for at least 3 cm. The uterus is now held by its vaginal attachment only and the vagina is clamped with right-angled clamps, one pair immediately below the other.

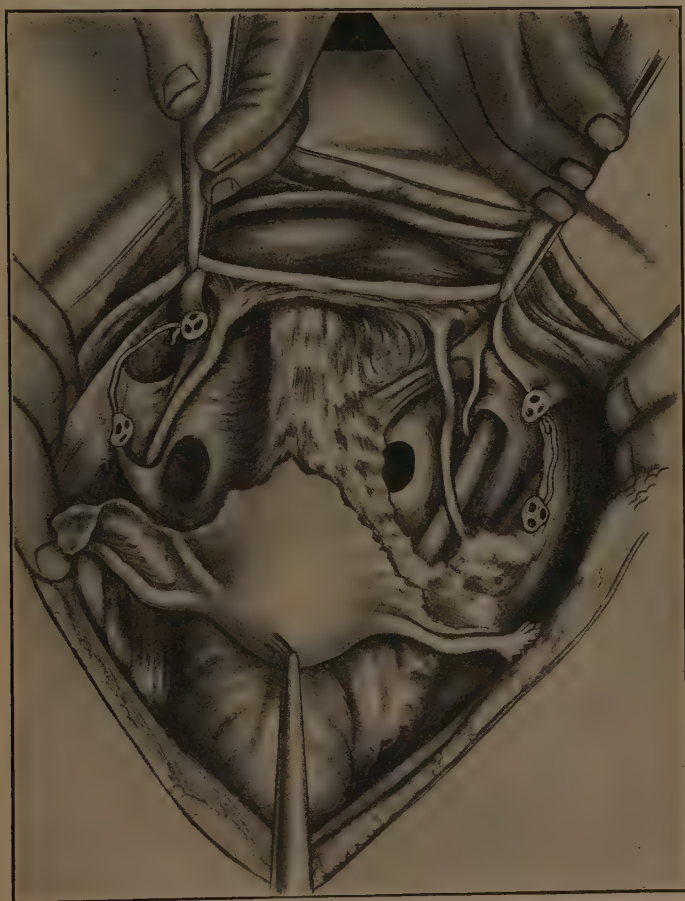


FIG. 183.—Pan-hysterectomy. (*Wertheim.*). "In simple cases the vesical end of the ureter separates without difficulty."

The incision which is to free the uterus and upper portion of the vagina is made between these clamps, the upper pair preventing infection of the peritoneum from the cervix, the lower

pair preventing infection from the vagina and temporarily controlling hemorrhage from its cut edges.

The ureters should be in plain view during all the maneuvers which follow the preliminary step of clamping and cutting the

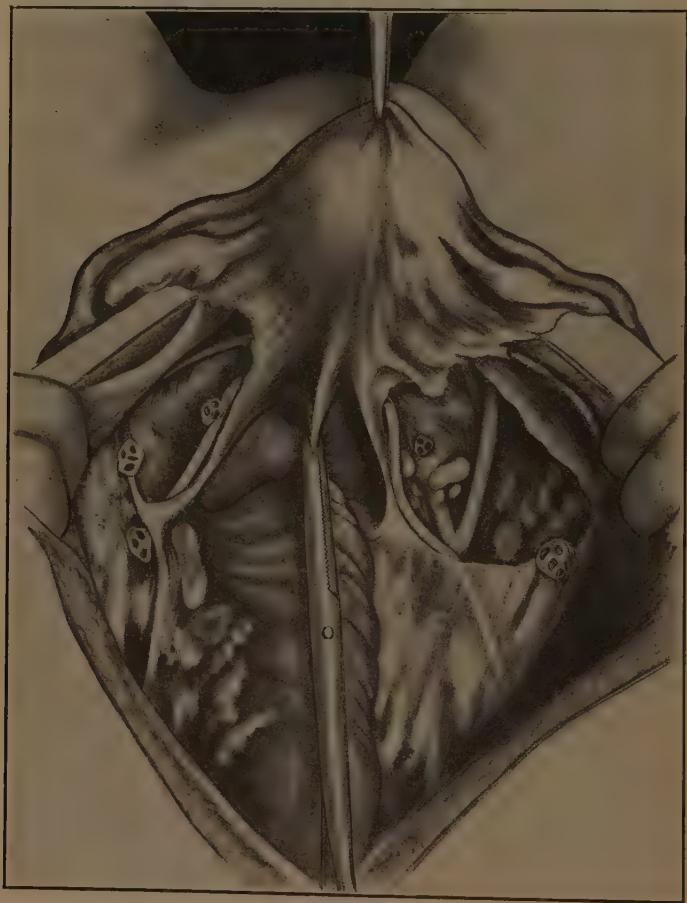


FIG. 184.—Pan-hysterectomy. (*Wertheim.*) "Next follows the separation of the rectum from the vagina."

round ligaments and tops of the broad ligaments. Hemorrhage from the vaginal wall is permanently controlled by clamping and

tying as the preliminary right-angled clamp is loosened, and the lateral angles of the vagina are then sewn up. Bleeding from the vaginal plexus of veins is likely to be free and should be



FIG. 185.—Pan-hysterectomy. (*Wertheim*.) "For this purpose the parametrium is divided as closely as possible to the pelvic wall."

controlled by ligatures and suture ligatures. The central portion of the vagina is left open for drainage of the connective-tissue spaces as in pan-hysterectomy for benign conditions, and the peritoneum closed over the raw surfaces as in that operation.

Should a break in the technique permit the least soiling by any material from the cancerous cervix, the peritoneum should be closed at its lateral aspects only, and the whole bottom of the



FIG. 186.—Pan-hysterectomy. (*Wertheim*.). The previous step should be preceded by "applying to the parametrium before dividing it, four or five bent clamps."

pelvic cavity be drained by a loose mass of gauze extending into the vagina. The abdomen is closed as usual.

This brief description while differing in minor points gives an

idea of the extent and thoroughness of the radical operation as advocated by Wertheim.

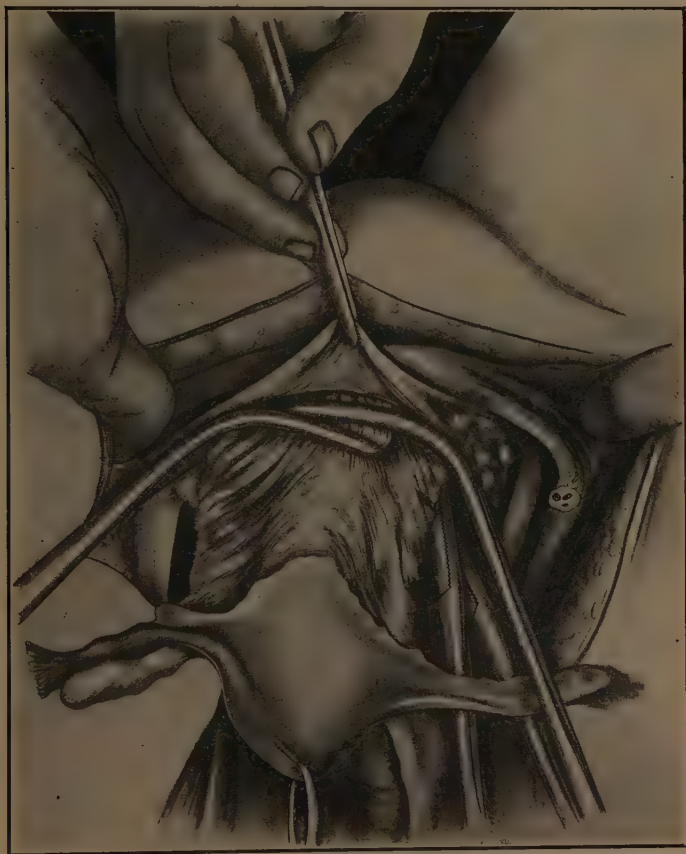


FIG. 187.—Pan-hysterectomy. (Wertheim.) "Strong clamps are applied to the vagina before its division so as to isolate the cancer from the vagina."

To the author the combined operation appeals more strongly than this operation which is entirely abdominal.

COMBINED VAGINAL AND ABDOMINAL OPERATION FOR CARCINOMA
OF THE CERVIX

In the combined operation, the cervix is cauterized as before but the sectioning of the vagina is performed before the abdomen is opened. This is accomplished by an incision which encircles



FIG. 188.—Pan-hysterectomy. (*Wertheim.*) The vagina "is divided below these clamps."

the entire vagina at as great a distance from the cervix as seems necessary. That portion of the vagina above the circular incision is dissected free in all directions until a large cuff is formed which is folded over the cervix and sutured in position,

thus completely covering in the diseased area. The lower portion of the vagina is again sterilized by mopping with tincture of iodine and packed with iodoform gauze, when, after



FIG. 189.—Pan-hysterectomy. (*Wertheim.*) “Bleeding from the paravaginal tissue is stopped by stitching around the vaginal stump.”

changing instruments, gloves, etc., the abdomen is opened and the operation proceeds as before described until that stage in which, in the typical operation, the right-angled vaginal clamps

are applied. When the bladder has been stripped from the cervix anteriorly and the rectum from the vagina posteriorly, the connective tissue around the vaginal mucosa can be readily separated with the finger, and the uterus and upper vaginal cuff come away without the necessity for clamping.

This operation is advantageous in that sectioning of the vagina is done from below and the amount of tissue which should be removed can be more accurately determined, and it also locks up the infected cervix at an early stage of the operation.

Especial points to be noted in any operation for cancer of the cervix are: early exposure of the ureters, ligation of the uterine vessels *external* to the ureters, removal of the entire parametrium, and protection of the peritoneum from contamination, either by clamping the vagina as in the Wertheim operation, or enclosing the cervix in a cuff of vaginal wall as in the combined operation.

The illustrations accompanying the Wertheim operation have been redrawn from the article of Wertheim's above mentioned, and the legends are abstracted from his description of the operation.

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CHAPTER XI

DISEASES OF THE UTERINE TUBES

The uterine tubes are developed from the same foetal structures as the uterus, viz., the Müllerian tubes. As their histological structure is strikingly similar and their physiological activity is concerned solely with the process of impregnation, one would expect a marked similarity in their diseases. Clinically this is true of inflammatory processes, but the pathological result of infection is strikingly different owing to the fact that one end of the tube communicates with the peritoneal cavity, and also that the lumen of the tube is so narrow and its wall so thin that it readily becomes occluded and distended.

Developmental defects of the tube are treated in the chapter devoted to developmental defects in general.

Acute Salpingitis.—Acute salpingitis, like acute endometritis, may have its origin in either septic or specific infection. Septic salpingitis may be due to extension of a septic process outward from the endometrium, to the extension of a septic process from the broad ligament, or to extension from an acutely inflamed ovary. An occasional infection of the tube is due to its involvement in a pelvic peritonitis having its origin in appendicitis or visceral perforation. While septic processes having their origin outside the female genitalia may be very dangerous, the involvement of the tube is usually limited to its peritoneal coat and is therefore of no immediate importance, although the after-results may be adherent impermeable tubes causing pain and sterility.

All forms of septic inflammation of the tube are less frequent than specific infection, the brunt of septic pelvic processes being borne by the ovaries, pelvic cellular tissue, and peritoneum.

Septic salpingitis, therefore, is subordinate in importance to infection of other tissues in which the inflammatory process is more intense, and the symptoms and physical signs are largely dominated by those of oophoritis, cellulitis, and peritonitis.

Specific salpingitis, on the other hand, is very common, is



FIG. 190.—Chronic purulent salpingitis. In this section there is a marked fibroblastic proliferation in the wall of the tube and likewise an infiltration in the wall of the tube with polymorphonuclear leucocytes. The stroma of the folds is markedly infiltrated with polymorphonuclears which are gathered in many places to form small abscesses. One of these is seen in the small fold of the central portion of the field. The lumen of the tube contains much pus, and we have a picture of a polymorphonuclear infiltration accompanied by fibroblastic proliferation. This is the gonorrheal type of purulent salpingitis.

productive of distinct pathological lesions, and is always due to extension of gonorrheal infection from the mucous surface of the uterus to the mucous surface of the tube. While gonorrhea of the corporeal endometrium may leave no evident after-effect, the results of gonorrhea of the tube are permanent,

and this is true even though the gonococci die out rapidly once the lumen of the tube becomes a closed cavity. Pyosalpinx, chronic hypertrophic salpingitis, hydrosalpinx, occlusion of the fimbriated end, strictures throughout the course of the tube, and adhesions to neighboring structures, all remain and



FIG. 191.—Chronic fibroid salpingitis. Practically a healed salpingitis. The wall of the Fallopian tube is thickened because of the proliferation of fibrous connective tissue, the stroma of the folds is also more increased and more fibroid than normal and the vessel walls thickened. There is no polymorphonuclear infiltration in this material, but occasional plasma cells are to be found. The epithelium is intact and the lumen free from purulent exudate.

are known clinically as chronic salpingitis; chronic salpingitis, therefore, is merely the permanent result of the acute inflammatory process which preceded it. In the acute form of specific salpingitis, swelling of the mucosa of the tube with suppuration of its surface takes place very early, the pus discharging from its fimbriated end. If the process is so acute

that profuse suppuration occurs before the fimbriated end becomes sealed, a considerable quantity of pus may be poured into the pelvic cavity. By reason of the swelling, and also through subsequent ulceration of portions of the tubal mucosa, it may be obstructed at various points in its lumen. By adhesion of the fimbriated end to neighboring structures, or, what is more common, by inversion of the fimbriæ and adhesion of their peritoneal surfaces to each other, this end soon becomes closed so that pus no longer is discharged into the abdominal cavity. If the process is very acute the infection may extend directly through the tube wall and thus cause a local peritonitis in the immediate vicinity, local peritonitis produced by one or the other or both of these processes being an inevitable result of the hyperacute type of gonorrheal salpingitis. In the more common less acute form, little or no pus may be discharged into the peritoneal cavity, the fimbriated end of the tube closing by inversion and adhesion of its fimbriæ and direct extension through the tube wall not taking place. Suppuration of the tubal mucosa is not so profuse and no great quantity of pus may be retained within the tubal lumen. The tube wall may be extensively infiltrated and much thickened but the lumen is not greatly distended. The involved tube is usually prolapsed behind the uterus, this prolapse being the result of enlargement and increased weight of the tube preceding its fixation by adhesions. Should the process be very acute the tube may not prolapse, adhesions forming so rapidly from the irritation or exuded pus that the tube remains fixed in its normal position, but should the process be slower, the weight of the tube causes it to fall to the bottom of the pelvis where it later becomes adherent through the medium of the peritoneal exudate which is poured out around it.

The characteristic and permanent results of tubal inflammation are most marked toward its abdominal end. Many instances of hydrosalpinx, pyosalpinx, and hypertrophic salpingitis are observed in which that portion of the tube near the

uterus is comparatively or entirely healthy, and this fact has an important bearing upon the question of the recurrence of gonorrheal salpingitis. This recurrence is not due, as is so frequently taught, to a lighting up of the inflammatory process in that portion of the tube which was originally involved. On the contrary recurrence is similar in origin to the primary attack, the sequence of events being dependent upon the fact that gonorrhea of the cervix persists indefinitely, and over-exertion, excessive coitus, or unknown causes may result at any time in a fresh extension from the cervix to the endometrium of the body, and thence outward to that portion of the tube which is not already occluded. Repeated attacks of salpingitis and pelvic peritonitis may take place in this manner without further involvement of the abdominal end of the tube, which already is deprived of its epithelial coat and possibly so distended and occluded as to form a distinct pus sac. Rupture of the distended tube may cause a second attack of pelvic peritonitis, but this is much less frequent than recurrent inflammation of its uninvolved portion.

One factor, which has an important bearing upon the treatment of specific salpingitis, is that the peritonitis which accompanies it is local in its character, gonorrheal peritonitis from unmixed gonorrheal infection being almost unknown in the adult; and a second equally important factor is the practical certainty that the acute symptoms sooner or later will recur.

Symptoms and Clinical History.—Two widely different clinical pictures are presented by acute salpingitis depending upon whether the disease follows immediately upon an attack of acute gonorrhea, or whether it comes on as a sequel of the milder but more common form of latent gonorrheal endocervicitis. In the first, all the evidences of acute pelvic infection take place during or immediately succeeding an attack which was distinctly recognizable as acute vulvar and cervical gonorrhea. In the second, the evidences of a preceding acute infection are less, or they may be entirely wanting, there having been only

a little dysuria, a trifling yellowish leucorrhea, and some indefinite pelvic discomfort.

In the hyperacute type the patient is seized with severe pain upon one side of the pelvis and abdominal distension soon occurs, these symptoms being due to a coincident peritonitis which is the result of the outpouring of pus from the suppurating tube. Associated with the pain and distension there is sharp elevation of the temperature and pulse with nausea and vomiting. Ordinarily the very acute discomfort is short lived, and there may be a lull in the symptoms for a day or two, only to be followed by an exacerbation in which the pain is most intense upon the other side.

While the *very* acute symptoms last only a few days there is some pain, tympany, elevation of temperature, etc., for a considerable period. These show a gradual subsidence in violence but do not entirely disappear for several weeks, and even then there may be a slight elevation of temperature in the evening, some distension and discomfort after taking food, and altogether so much ill feeling that the patient is confined to her bed the greater part of the time. From this attack she finally convalesces to a stage of semi-invalidism with pelvic pain on the slightest provocation. The first sharp attack of peritonitis is more likely to occur during the menstrual period which immediately succeeds the attack of acute gonorrhea, and it usually results in an increased prolonged menstrual flow.

Upon examining such a patient the lower portion of the abdomen is found hypersensitive to the touch, the area of hyperæsthesia corresponding fairly well to the area of peritoneal involvement. Rigidity of the abdominal muscles is made out although the board-like hardness which is present in acute appendicular peritonitis is not usually in evidence. Upon vaginal examination there may be but little of the profuse yellowish discharge which one would expect with an acute gonorrhea, the sudden suppression of urethral discharge at the onset of epididymitis in the male being paralleled by the sudden cessa-

tion of cervical and uterine discharge upon the occurrence of salpingitis in the female. On digital examination at the onset of the attack, nothing more may be ascertained than that there is extreme tenderness and an indefinite sense of fullness at one or the other side of and posterior to the uterus. This tenderness may be so marked that adequate examination is intolerable, and the collection of peritoneal serum in the pelvic cavity may be sufficient to obscure the outlines of the involved tube. Motion communicated to the uterus by the finger is extremely painful. After a few days the serous peritoneal exudate solidifies and becomes perceptible to the touch as a gradually increasing, fixed, pelvic mass. With the onset of suppuration in the other tube tenderness becomes more marked upon that side, and the quantity of fluid poured into the pelvic cavity is increased until in the severest cases the entire pelvis may within a few days appear to be choked by a large firm mass which consists of the uterus, tubes, ovaries, intestine, and omentum all glued together by hard pelvic exudate. As the infection subsides this exudate gradually absorbs and the tubes become more plainly perceptible, and after the lapse of some weeks it may be possible to distinctly outline a distended adherent tube on either side of or behind the uterus.

Between this hyperacute type due to virulent acute gonorrhea, and the very mild form arising from an unsuspected latent focus in the cervix, there are all grades of severity, but the subacute variety is the one usually seen. In this the patient may at no time have been confined to bed, or at most have been incapacitated for but two or three days.

Investigation of the history of patients with the mild form brings out the fact that soon after marriage or a suspicious intercourse some leucorrhea and burning urination were noted, and that shortly after this there was abdominal and pelvic discomfort which never has entirely disappeared and which has been subject to exacerbations after overwork or excitement. The pain usually has been more severe upon one side and seemed to

make its appearance gradually, it, together with some leucorrhea and menorrhagia, having persisted for several weeks or months before the patient presented herself for consultation.

Upon abdominal examination nothing may be noted other than a little tenderness in one or the other hypogastric region. Upon vaginal examination there may or may not be a sufficient amount of discharge to arouse suspicion, but stripping the urethra usually results in the extrusion of a drop or two of muco-purulent discharge. The mouths of the ducts of the greater vestibular glands may show a small red area and the cervical mucosa be pouting and everted, the tenacious cervical mucus being mixed with pus and possibly with blood.

Bi-manually the uterus is found less freely movable than normal, and there is a tender fixed mass in the cul-de-sac or at one or both sides of the uterus. Careful examination usually elicits a mass on both sides, although but one may be apparent on cursory examination. Patients with this history and such physical findings may be considered to have recurrent salpingitis of a mild type, but the ultimate outcome is precisely the same as that following the hyperacute form, excepting that after the latter the physical evidences are more striking and the patient's discomfort more marked. These two classes, that is, the hyperacute type after the patient has recovered so far as acute symptoms are concerned and the mild forms of recurrent salpingitis, together comprise that large class that goes under the general name of *chronic salpingitis*, and for this reason separate consideration of the latter is unnecessary.

Differential Diagnosis.—In the hyperacute type the differentiation lies between salpingitis and any other possible cause of acute pelvic peritonitis, but this differentiation is not often difficult as, aside from acute peritonitis secondary to infection of the ovary or the uterus, appendicitis is practically the only source of acute pelvic peritonitis with which it might be confused. Acute perforative appendicitis has a fairly characteristic onset as outlined by Murphy, consisting of first, epigastric

pain, next, vomiting, and last, elevation of temperature. In acute inflammatory processes having their origin in the tubes the pain at the onset is rarely in the epigastrium, vomiting is not so constant, and elevation of temperature may be present before either. On abdominal examination in early appendicitis the rigidity is confined to the flat muscles of the right side, and the cutaneous hyperæsthesia is located higher on the abdominal wall than in acute salpingitis. If, however, septic material escapes from a perforated appendix and drains into the pelvic cavity the well-known symptoms of pelvic peritonitis are immediately manifested, and upon examining such a patient bimanually a mass may be found to the right of the uterus, which entirely surrounds the tube and ovary of that side. Under such circumstances a differential diagnosis may be almost or quite impossible. While a gonorrheal history does not rule out appendicitis, it does make the probability of salpingitis much stronger. The leucocyte count in acute appendicitis is likely to be higher than in a salpingitis presenting the same degree of evidence of peritoneal involvement, and if the acute pain at the outset was limited to the left side of the pelvis while a mass has made its appearance about the left tube and ovary, the probability is that salpingitis rather than appendicitis is causing the symptoms.

Having ruled out appendicitis it becomes necessary to differentiate if possible between septic and specific salpingitis, and this is accomplished chiefly by the aid of the history together with the presence or absence of a gonorrheal discharge from the cervix, urethra, or vestibular glands. Errors in diagnosis, as between septic and specific salpingitis, are more commonly made because of a wilfully inaccurate history than for any other one reason.

The differential diagnosis of the milder types of acute salpingitis which merge imperceptibly into the so-called chronic form, resolves itself into distinguishing hypertrophic salpingitis, hydrosalpinx, and pyosalpinx from other enlargements in or

about the tube and ovary. A recurrent attack of mild salpingitis is frequently mistaken for ectopic pregnancy; acute pain, slight elevation of temperature, irregular menstruation, and a palpable tender mass at one or the other side of the uterus being characteristic of both. Preceding the final rupture of an ectopic sac differentiation is sometimes impossible, bilateral disease speaking of course in favor of salpingitis. At the time of final rupture the evidence of internal hemorrhage in ectopic pregnancy is so striking that an error in diagnosis is hardly possible. A small ovarian cyst readily becomes twisted upon its pedicle and is a source of error which it is impossible to eliminate, bilateral disease again being in favor of salpingitis. Tuberculosis of the tube and ovary is an infrequent source of error, and its diagnosis is likely to be confirmed by free fluid in the abdominal cavity, a higher evening temperature, palpable masses elsewhere in the abdomen, and possibly the finding of tuberculous foci in other parts of the body. The smaller fixed tubes which are hardly palpable to the examining finger are often overlooked; a trivial thickening above the vaginal vault, a little lessening of the mobility of the uterus, and a history of sterility extending over several years being the principal points in diagnosis.

Prognosis.—The prognosis of acute *septic* salpingitis is that of the disease to which it is secondary, the tubal lesion itself being unimportant. The prognosis of acute *specific* salpingitis in the adult and outside the puerperium is entirely favorable *so far as life is concerned*. In very young children the disease is rare but dangerous, and in adult life if the infection takes place immediately succeeding labor it is decidedly menacing. While under ordinary circumstances the outlook as to life is very good, the same cannot be said concerning restoration to health. Succeeding the very acute cases there are usually weeks and months of semi-invalidism, with slight elevation of temperature at night, much abdominal distress, and an occasional profuse menorrhagia. More or less constant discomfort may persist

indefinitely with occasional acute attacks which are similar to but not so severe as the first one. Any physical changes which are found a few months after acute specific salpingitis subsides may be considered to be permanent, restoration of the integrity of the tube being practically unknown. The same is true of the milder form although the patient's discomfort is rarely so great, recurrences are not so severe, and menorrhagia is only an occasional symptom, but pelvic distress is persistent, in the sense that while it may not occur daily or even monthly, it inevitably returns. It can be said confidently that complete resolution of a well-defined case of specific salpingitis is not to be expected, and that the lesions produced, although they may vary from time to time, are permanent and incurable by any method short of operation.

Treatment of Salpingitis.—The early treatment of acute *septic* salpingitis is that of the primary disease; later it may be that of acute pelvic peritonitis with pus formation. The treatment of *specific* salpingitis resolves itself into the treatment of the acute attack, whether primary or recurrent is immaterial, and the treatment of the distorted, occluded, adherent tubes which are left. The treatment of specific salpingitis during the acute attack is distinctly palliative and medical, surgical interference at this time being not only unnecessary but associated with a high morbidity as well as a perceptible death rate. The primary indications are to assist nature in her efforts to localize the infection, and to keep the patient comfortable until the acute process has run its course. To fulfill the first, cathartics are avoided and the bowels are kept open by enemas only. The diet is of such a character as to put the least tax on the digestive organs and leave the smallest amount of débris in the intestinal tract. The patient should be sent to bed and should remain there during the entire duration of the disease, every motion of the body tending to distribute the infection beyond its original location. Local applications to the abdomen appear to relieve the pain, cold being more generally useful than heat, although

in the later stages heat is often borne better than cold. Local applications through the vagina in the form of hot douches, applications to the cervix and uterus, tampons, etc., are not only useless but are very annoying to the patient and interfere with the first principle of treatment, which is rest. Excessive pain should be relieved by the use of opiates, morphia or codia being preferable to opium because they are less constipating, and while the patient should not be kept narcotized she should not be allowed to suffer. No fear need be entertained of setting up a narcotic habit if opiates are used only during the acutely painful stage of the disease. The temperature is rarely high enough to need any consideration, and antipyretics are not necessary for the relief of fever although some of them are useful for their analgesic properties when the pain is not so severe as to demand morphine.

The natural tendency to operate when a palpable swelling makes its appearance in the pelvis, or the recto-uterine excavation presents a bulging mass, should not be acceded to unless there is a mixed infection and distinct evidence of a pelvic abscess pointing toward the posterior vaginal fornix. Under the latter circumstance incision and drainage are indicated, but in a pure gonococcus infection the patient will recover just as rapidly if this is avoided, and moreover, she will be without the risk of a permanent tubo-vaginal fistula. Radical operation with extirpation of the diseased tube or tubes during the acute stage is advised by some authorities, but there are many valid objections to this procedure. Operation in the midst of acute infection is more hazardous than in the cold stage, is far more bloody, and drainage is more often necessary. In addition to this, the swollen œdematous condition of the ovaries makes it impossible to tell whether or not they are hopelessly diseased, and their extirpation is likely to be practised if operation is performed at this time, whereas after the acute symptoms have subsided it usually will be found that one or both can be retained with safety. It occasionally happens that after the

subsidence of the very acute symptoms a patient will continue to have a little evening elevation of temperature, the pain will be quite severe with intermissions and exacerbations, emaciation is progressive, and on the whole the operative risk appears to be justified by the continued suffering. Only under such circumstances should one advise radical operation during either the acute or subsiding stage of acute specific salpingitis.

In chronic cases the pain caused by adhesions, distorted displaced tubes, hydrosalpinx, and pyosalpinx may be relieved temporarily by palliative treatment if for any reason it seems judicious to tide the patient over for a time before resorting to radical operation; on the other hand, the victims of this condition should understand that such palliative methods result in nothing better than the relief of discomfort, and that permanent cure is not to be anticipated from anything short of removal of the diseased organs. Prolonged hot douches, taken while the patient is in a reclining position, and counterirritation to the vaginal vault and anterior abdominal wall give some relief from pain. Glycerin tampons snugly applied to the vaginal fornices are of value in relieving discomfort, but the routine adoption of these measures with the idea of complete cure is chimerical, and leads only to disappointment and loss of confidence on the part of the patient.

Tuberculosis of the Tubes.—Tuberculous inflammation of the uterine tubes is a common forerunner of tuberculous peritonitis. Unfortunately it rarely is discovered before the latter affection is in full swing, and no pathognomonic evidence of tuberculous salpingitis can be depended upon to establish a diagnosis before the symptoms of tuberculous peritonitis have become quite plain. The symptoms and physical findings are essentially those of tuberculous peritonitis with which there is associated a palpable tumor at one or both sides of the uterus. Pain, evening elevation of temperature, marked emaciation, night sweats, free or encysted fluid in the abdominal cavity, masses of exudate palpable through the abdominal wall, and

especially the rolled up adherent omentum to be felt at or near the umbilicus; these, together with a positive tuberculin reaction, are the principal evidences of the latter disease. A sign of some value is the peculiarly full rounded abdomen, which is almost always present and which is in striking contrast to the general thinness of the patient. When with these one

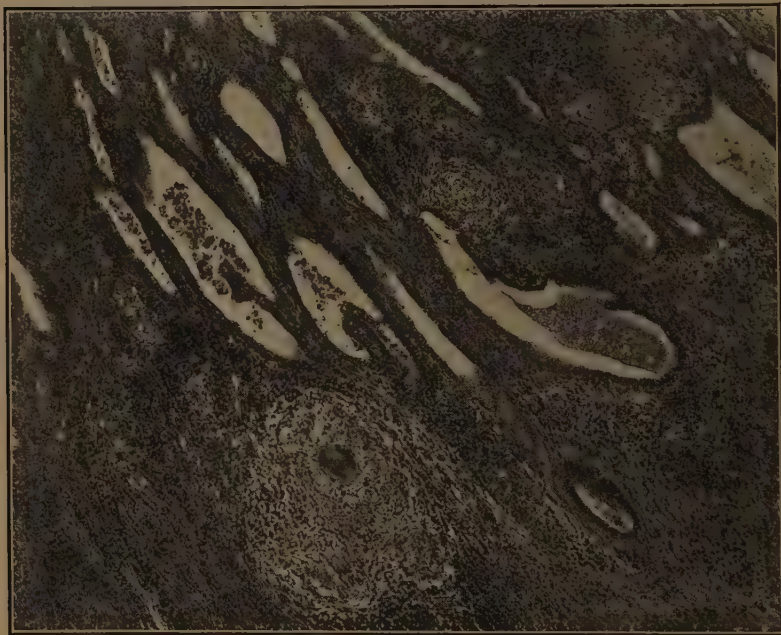


FIG. 192.—Chronic tuberculosis of Fallopian tube. There are numerous miliary tubercles in the section, the most prominent containing a large giant cell.

finds a palpably enlarged tube or tubes, it is safe to assume that the peritoneal infection had its origin in these organs.

The treatment of tuberculous salpingitis is that of tuberculous peritonitis plus the removal of the diseased tubes, providing the patient's general physical condition is such as to justify operation at all. In that form of tuberculous peritonitis in which ascites is a marked feature, abdominal incision and evacua-

tion of the fluid *without drainage* is sometimes productive of great good. When no free fluid is present the result of opening the abdomen is far less favorable, but if the abdomen is opened at all, removal of the tubes adds but little to the risk involved unless the adhesions are dense, and their separation time consuming and dangerous to the integrity of the intestine.

The general treatment of tuberculous peritonitis associated with or dependent upon tuberculous salpingitis is that of tuberculosis in general; rest as long as elevation of temperature persists, absolute open-air treatment, and as much nutritious food as the patient's digestive organs can manage. When laparotomy with removal of the tubes can be practised early in the course of the disease and be followed by a systematic open-air cure the prognosis is relatively quite favorable. When the disease has progressed to the stage of hectic fever, marked emaciation, and rapid feeble pulse, medical treatment without operation is more likely to be satisfactory although the outlook in these cases is distinctly a desperate one.

Actual new growths of the tube are rare and not often diagnosed until after the abdomen is opened, and their diagnosis therefore need not be dwelt upon.

SALPINGECTOMY

The removal of the uterine tubes for the results of inflammatory disease is the most common major operation in pelvic surgery. When the tubes are occluded but free from dense adhesions the operation is simple, while the removal of a large densely adherent pyosalpinx which has perforated into the rectum or bladder is one of the most difficult undertakings in surgery. Upon opening the abdomen under the latter circumstances one may be confronted by old adhesions roofing over the entire pelvic cavity, and these may cover a dense mass consisting of the pelvic organs, omentum, small and large intestine, and bladder. The inexperienced operator

should make it his first business to determine whether or no he is capable of extirpating the diseased organs. It is better to close the abdomen at once than to break up adhesions, injure viscera, and then find that the case, so far as he is concerned, is inoperable. Should it be determined to proceed, the first step is the separation of adhesions and demonstration of the diseased tubes. The omentum should be clamped and ligated if



FIG. 193.—Chronic salpingitis with adhesions. Distended right tube adherent in normal position. Left tube buried in old adhesions. Uterus drawn to left by adhesions to sigmoid.

the adhesions are old and dense, or separated with the fingers if recent. As soon as the omentum is released, it, together with any coils of free intestine, should be lifted out of the pelvic basin and a wall of gauze pads be so arranged as to keep the intestine from crowding into the operative field, and at the same time prevent soiling of the upper abdomen with any pus that may be encountered. A line of cleavage between the adherent tube and adjoining pelvic structures should be sought with the

finger. In long-standing cases this at first may seem impossible, but perseverance in attacking first one point and then another, even incising with the knife between *visible* coils of adherent intestine and the pelvic structures, finally enables the experienced operator to determine the line of separation and outline the distended tube. It cannot too often be repeated that sepa-



FIG. 194.—Chronic salpingitis with adhesions. One distended tube anterior to uterus, the other posterior. The result of “hyperacute gonorrheal salpingitis.”

ration of adhesions should be done with gentleness, and that even with the greatest care an opening may be made into the bowel or bladder. Should such an accident happen the damaged viscus is to be repaired at once. Occasionally a case is encountered in which a coil of intestine is so involved in the inflammatory mass that its sacrifice is necessary, and an

operator who is not capable of performing intestinal resection has no right to undertake an operation upon old pus tubes which have undergone repeated attacks of inflammation. As the separation of adhesions proceeds, the released intestine should be packed off with gauze pads so that that portion of the pelvis in which the work is being prosecuted may at all times be free from intestinal coils. Eventually the fingers can be insinuated under the diseased tube, whose lowest boundary is usually found at the bottom of the pelvic cavity. The separation of the tube



FIG. 195.—Salpingectomy. Anterior view. On the left, both tube and ovary are clamped. On the right, the external clamp is placed between the tube and ovary.

from the rectum and posterior surface of the broad ligament should be continued with care, as the rectum is easily torn and the large veins in this locality are readily injured. When all adhesions have been separated and the tube and ovary are drawn up in plain view, it remains to be determined whether the ovary shall be sacrificed with the tube. In many cases it is of advantage to separate the adhesions on both sides and examine both ovaries before deciding this question. If one ovary appears to be relatively healthy excepting for the raw surface left after separating the adhesions to its surface, plans can be

made for its retention, while a badly diseased ovary upon the other side, or one distorted by adhesions and cyst formation, can be removed. An understanding with the patient upon this point, viz., the removal of the ovaries, should be arrived at before operation, as most women prefer the retention of one or a portion of one ovary even at the risk of a second operation, while others have suffered so severely that they will take no chances and prefer that a clean sweep be made rather than to incur the

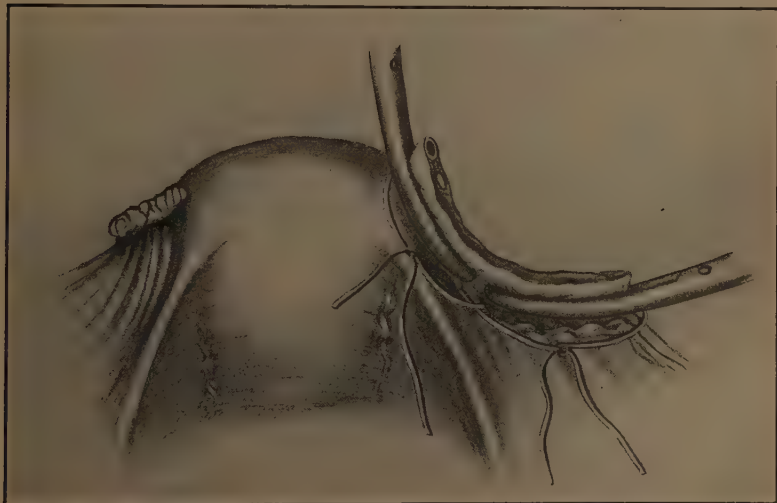


FIG. 186.—Salpingectomy. Anterior view. The left broad ligament has been clamped and the ligatures laid but not tied. The right tube has been removed and the interlocking ligatures tied.

possibility of another operation later. If the ovary is to be sacrificed and the patient is not in good condition because the early steps of the operation have been prolonged, the simplest method for the removal of the tubo-ovarian mass should be adopted. This consists in perforation of the meso-salpinx at its middle, ligation of the outer end of the broad ligament external to the ovary with one-half a double ligature, and ligation of the inner end of the broad ligament together with the

tube at its junction with the uterus with the other half. The tube and ovary are cut away and any small bleeding points in the meso-salpinx caught and tied. A somewhat safer method, which is equally rapid, consists in placing a clamp on the outer end of the broad ligament beyond the ovary, and another on the inner end of the broad ligament including the uterine extremity of the tube, the points of the clamps meeting on the meso-salpinx below the tube. The tubo-ovarian mass is then excised



FIG. 197.—Salpingectomy. Anterior view. A neater method than the preceding in which the tubal stump is excised from the uterine horn.

distal to the clamps and the broad ligament tied with two ligatures, one placed just behind the outer clamp and the other just behind the inner. Each clamp should be loosened as the first knot is drawn down, and the clamp be entirely removed as soon as it is found that the knot is tight and the thread not likely to break. A neater method of operating should be used when time is of no special moment. This consists of clamping the ovarian vessels at the outer end of the broad ligament external to the ovary, excising the uterine end of the tube from the

uterine wall, clamping the utero-ovarian artery just beneath this point, cutting away the tubo-ovarian mass, and clamping any small vessels that spurt in the mid-portion of the broad ligament. The operation is completed by tying all vessels and whipping over the top of the broad ligament with a continuous catgut stitch. In this manner but little raw surface is left to contract adhesions to the intestine or omentum, and the tube is so removed that no stump remains to give further trouble. If the ovary is to be retained, the clamp or ligature applied to the

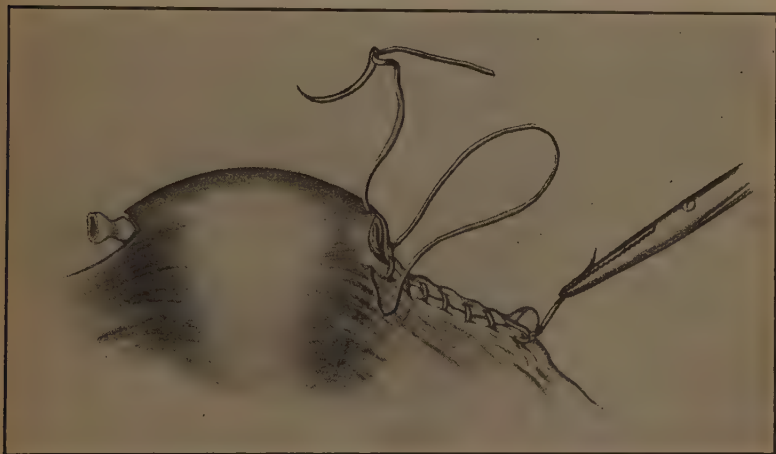


FIG. 198.—Salpingectomy. Anterior view. "The operation is completed by tying all vessels and whipping over the top of the broad ligament."

outer end of the broad ligament should be placed *between* the ovary and tube. Ligation of the ovarian artery external to the ovary produces so much disturbance of its nutrition that more or less subsequent pain and degeneration of the ovary with cyst formation is to be anticipated. As the stump is short, the ligature between the tube and ovary, whether placed before or after clamping, must be very carefully applied and it is a wise safeguard to whip this over with a fine catgut stitch after the ligature is tied. Both tubes having been removed, it may be found that injured veins are bleeding upon the posterior surface

of the broad ligaments. These should be caught separately and either tied with plain catgut or closed with sutures of the same material, emphasis being laid upon the necessity for using plain gut because the anatomical relations are so distorted that it is possible to include the ureter in a ligature, or kink it by a suture placed in its immediate vicinity. If the suture is of plain gut it will absorb at an early date and result in no permanent damage. Hæmostasis so far as it concerns distinct vessels must be absolute, and the abdomen should not be closed until every one is controlled. Those sponges which were intro-

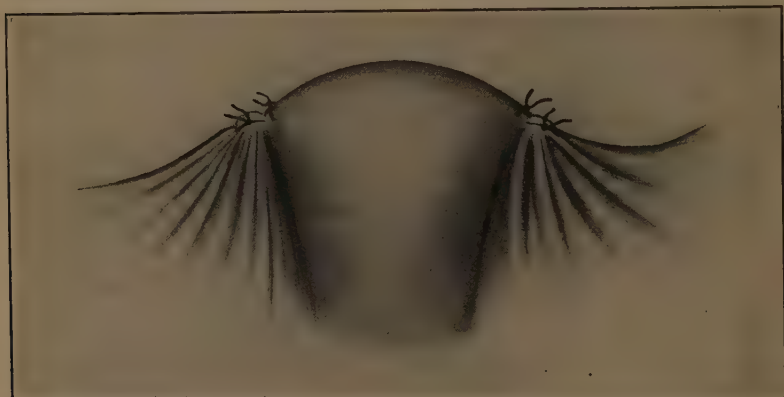


FIG. 199.—Salpingectomy. If there is but little induration in the broad ligament the external and internal ligatures may be so drawn together as to leave no raw surface.

duced to control oozing and fill the space from which adherent intestine was removed, are now withdrawn and replaced by a dry pad, which holds the intestine away from the site of operation while the pelvic cavity is sponged dry and inspected. When it is certain that active bleeding has stopped, the posterior wall of the uterus, the posterior layers of the broad ligament, the bottom of the pelvic cavity, and the top of the bladder are thoroughly sponged off with saline solution. Intestine which was packed away from the pelvis after adhesions were loosened is again inspected to be certain that no damaged spot

is overlooked. The sigmoid is then dropped behind the uterus, the omentum drawn behind the incision but not into the pelvis, and the abdomen closed with or without drainage. The subject of drainage is considered in the chapter devoted to gynæcologic surgery, but in a general way it may be said that the re-

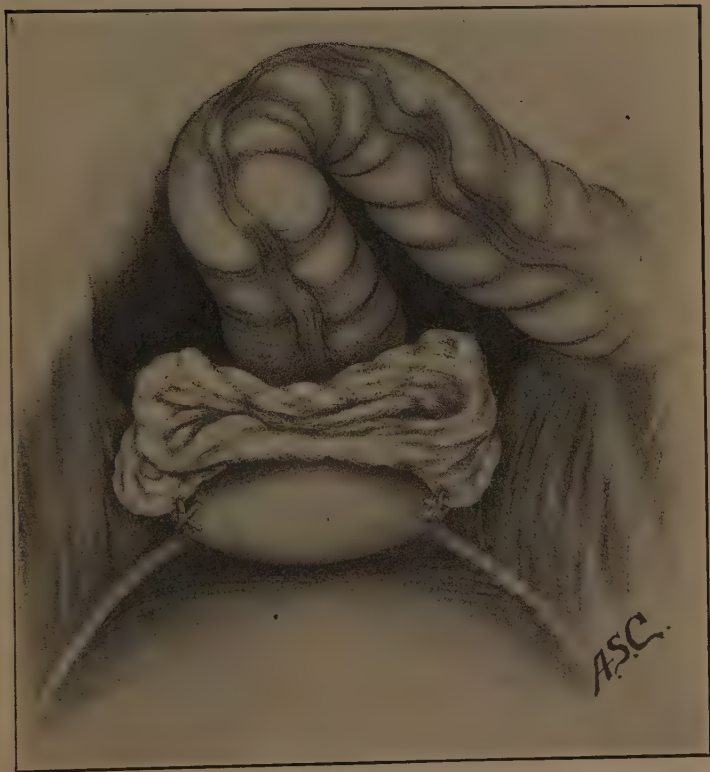


FIG. 200.—Salpingectomy followed by vaginal drainage. Superior view of the gauze cofferdam.

action against abdominal drainage has gone too far. Drainage, of course, need not be practised after the removal of old pus tubes unless there are extensive raw surfaces which cannot be adequately covered with normal peritoneum, and from which oozing is persistent. This is true even if the tubes have

ruptured, as the contents of old pus tubes are sterile. But in more recent cases in which a doubt exists as to the sterility of the contents of the tube, as well as when there is doubt as to the integrity of the rectal wall, drainage does no harm and may

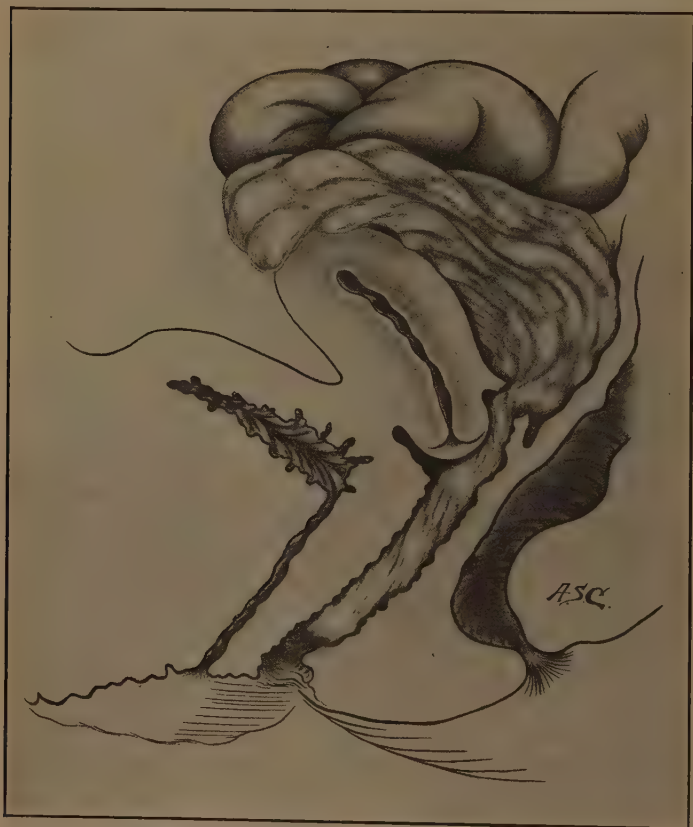


FIG. 201.—Salpingectomy followed by vaginal drainage. Sagittal section showing gauze cofferdam. The general abdominal cavity is shut off from the lesser pelvis.

obviate the necessity for opening an abscess or evacuating a hæmatoma, and may even prevent an attack of virulent general peritonitis. Such drainage may be made through the vagina, and for this purpose iodoform gauze is the best material, the

plan of its use being to pack the cul-de-sac tightly with one end of the strip, to lightly fluff the remainder of the gauze into the cavities from which the tubes have been removed and over any possible infected areas including the broad-ligament stumps, and then to drop the sigmoid over the gauze. Thus the general abdominal cavity is completely shut off from the lesser pelvis. After the abdomen is closed the patient is placed in the lithotomy position, and without making traction upon the cervix, the vaginal wall immediately posterior to it is seized with volsellum forceps and incised transversely with scissors to the extent of 3 or 4 cm. The connective tissue between the vaginal wall and the peritoneum and the peritoneum itself is then torn through, when the tightly packed end of the gauze can be drawn into the vagina. Another strip of iodoform gauze is placed in the vagina with its outer end protruding through the vulva. A large abdominal pad is placed over the vulva, and during convalescence every care is taken that the vulvar dressings are as aseptically handled as would be the dressings if the drain were through the anterior abdominal wall. Iodoform is advised rather than plain gauze since it inhibits saprophytic infection and decomposition, and the gauze is odorless even if retained a week or 10 days.

Special Points of Technique.—1. Careful walling off of the general abdominal cavity from that portion in which the operation is to be performed.

2. Great gentleness in the separation of adhesions.
3. Immediate repair of any opening into the viscera.
4. Complete hæmostasis. Secondary hemorrhage does not take place from vessels which are adequately tied.
5. The removal of the tube complete, healthy as well as diseased portion.
6. The covering of the stump and raw surfaces as far as possible with healthy peritoneum.
7. The drawing of the sigmoid into the pelvic cavity so that small intestine may not occupy this space and become adherent.

8. "When in doubt drain," according to the old formula.

After-care.—The after-care is that of abdominal section in general. The patient should be returned to a bed the foot of which is moderately elevated. In this way oozing is minimized, pain diminished, and to some extent the fixation of small intestine in the pelvic cavity is prevented.

Shock is rarely met with; when it is, or when hemorrhage has been severe enough to seem to indicate saline solution per rectum, it may be so used providing the rectum has not been injured. Should the rectum have been damaged, it is wise to dilate the anus before the patient regains consciousness and have a small rectal nozzle constantly in place to prevent pressure of gas upon the injured area, and enemas for the relief of distension or to open the bowels should be small and given without pressure for the same reason.

There is no objection to the use of moderate doses of narcotics for post-operative pain.

If drainage has been practised a small piece of vaginal gauze should be withdrawn and cut off after each urination, and the vulva should be irrigated after each urination and defecation.

The vaginal gauze may all be removed within two or three days, but the strip which has been placed in the abdomen should be left for a week or more. Early removal is painful and productive of fresh bleeding, and retention of the gauze 10 or 12 days does no harm providing the opening in the vaginal vault is liberal and has not been plugged by careless placing of the drain.

The catheter should be used only if spontaneous urination is impossible.

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CHAPTER XII

EXTRA-UTERINE PREGNANCY

The startling features of a pregnancy outside the womb, the cataclysmic character of severe intra-abdominal hemorrhage, and the brilliant results of proper treatment combine to render this subject one of perennial interest. Ectopic pregnancy is not rare as in the work of the average surgeon many cases are seen in the course of a single year, and it is probable that many others occur in which the death of the ovum takes place at so early a date that the symptoms are trivial and the correct diagnosis is not made.

Etiology.—Ectopic pregnancy primarily is practically always tubal. Attempts have been made to prove the possibility of primary ovarian pregnancy, and a few cases have been reported which bear out this contention, but theoretically only the uterine and tubal mucosa are fitted to receive an ovum, permit its implantation, and undergo such changes as to allow of its complete development, although the decidual reaction has been proven to occur on the ovary, as well as on the external surface of the uterus and other peritoneal-covered surfaces. When the tube ruptures or the ovum is expelled from its abdominal end, a sufficient area of chorion may remain adherent to the tubal mucosa to permit continued life of the ovum. In this event the foetus develops in the abdominal cavity, and the pregnancy may properly be considered as abdominal although the primary point of attachment of the chorion to the decidua was in the tube. It is conceded that we do not know precisely how the developing placenta overflows, as it were, from the tubal mucosa and becomes implanted upon the ovary and the peritoneum covering the pelvic structures,

but we know that such implantation does take place and that separation of the placenta from this attachment leads to terrific hemorrhage.

Obviously it is impossible to determine with certainty the point of junction of the spermatozoid and ovule in the human being, but investigation in the lower animals leads us to believe that this takes place regularly in the tube. It is not difficult, therefore, to understand how tubal implantation of the ovum might occur in the event that the ciliated epithelium failed to convey the impregnated ovum through the tube to the uterus. This failure may be due to a congenital anomaly by which a portion of the tube is not lined with ciliated epithelium, or to a congenital dilatation in which the ovum lodges, or to a stricture which it cannot pass. We can also understand how a mild salpingitis causing denudation of the tubal epithelium may leave the impregnated ovum stranded in some portion of the tube distal to the uterus. The conditions under which a tube is removed for extra-uterine pregnancy are such that adequate investigation as to the ultimate etiology is impossible, but the theoretical conception of some trifling tubal disease which has destroyed the ciliated epithelium or led to strictures in the tube probably is correct for the greater number of cases. The fact that tubal pregnancy repeats itself on the other side far more frequently than it occurs in women who have never been the victims of this condition points in the same direction, although the presence of several abnormally placed "decidual reaction" sites would also account for this phenomenon.

Life History of the Extra-uterine Ovum.—The great variety of end results in extra-uterine pregnancy, and the widely different clinical pictures presented by a number of cases, are most readily understood by a short account of what actually may happen after the implantation of an impregnated ovum in the tube. The trophoblastic action of the ovum, which leads it to behave as a parasite, and imbed itself in the mucosa anywhere from the fimbriated end to that portion in the uterine cornua, explains

many of the phenomena which follow. In addition, the thin muscular wall of the tube undergoes distension at an early date and this distension may result in its actual rupture, although one might conceive of a case in which trophoblastic activity did not result in perforation and the tubal muscle hypertrophied so promptly that no rupture occurred, in which event a full-term tubal pregnancy would follow. More frequently, however, this trophoblastic action of the ovum suffices to produce a small perforation and from this a little hemorrhage takes place. The original perforation may be minute, but the



FIG. 202.—Extra-uterine pregnancy. Note site of chorionic attachment.

continued growth of the ovum stretches the opening and, if the ovum lives, its continued trophoblastic action sooner or later results in enlarging the perforation and so producing recurrent hemorrhage into the pelvic cavity. Separation of the ovum from its attachment may take place at any time and cause its death before perforation of the tube, and with this separation some hemorrhage through the fimbriated end is certain to occur. The ovum is a foreign body, and foreign bodies in the tube probably cause contraction of the tube precisely as they do in the uterus; thus should the ovum become sufficiently separated, its expulsion from the abdominal ostium may take place, so-

called tubal abortion, and this is especially likely to happen if the primary site of implantation is near the outer end of the tube. Continued growth of the ovum may result in actual rupture of the tube with opening of some of the larger vessels and very severe intra-abdominal hemorrhage. Again, the ovum may be extruded into the abdominal cavity but still retain a sufficient area of chorionic attachment to furnish it with



FIG. 203.—Extra-uterine pregnancy. Unruptured tube.

nutrition; in which event the ovum may live and a foetus develop in the abdominal cavity. More commonly the ovum dies and undergoes ultimate absorption. The ovum, therefore, may continue to live and develop in the tube until it attains foetal maturity, or it may be expelled dead or alive from the abdominal end of the tube. If alive when expelled, it may die at once or continue to develop, or the tube may rupture at

any portion of its circumference with extrusion of the ovum through the perforation, the ovum living if a sufficient amount of placental attachment remains, or dying if the placental attachment is insufficient. If the foetus lives after extrusion in any manner it may go on until full term when false labor takes place, after which the foetus invariably dies. The foetus may die at any period of its career, or the amniotic sac in which

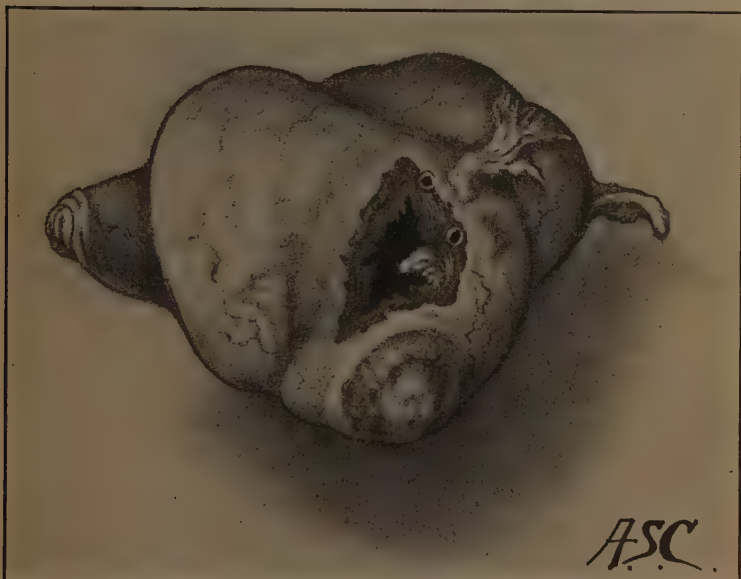


FIG. 204.—Extra-uterine pregnancy. Specimen illustrates perforation of tube with two vessels opened.

the foetus is retained after its expulsion from the tube may at any time undergo rupture. The effused blood in the abdominal cavity may be absorbed, or it may fail of absorption, become infected, and give rise to a localized abscess.

A moment's consideration of this rather complicated series of possibilities explains why the history differs so widely in different cases, and leads one to understand how the clinical course may vary; why there may be sudden death within the



FIG. 205.—Extra-uterine pregnancy. Drawing from specimen after opening unruptured tube. Tubal mole—the ovum died in tube.



FIG. 206.—Extra-uterine pregnancy. Specimen in which tubal abortion is taking place. Note clot in fimbriated end of tube.

first six or eight weeks of pregnancy, or all the vicissitudes of tubal abortion or tubal rupture with recurring hemorrhage from time to time; why there may be an illness extending over 9, 10, or 11 months with the symptoms of pregnancy, the development of a full-term foetus, false labor, retention of



FIG. 207.—Extra-uterine pregnancy. Drawing from specimen after opening tube and sac which had been extruded from fimbriated end of tube. "Tubal abortion—the ovum alive."

the foetus and membranes in the abdominal cavity, fatty degeneration of the foetus, or infection of the sac and its contents with expulsion of foetal parts through the bladder or intestine, together with the prolonged sepsis arising from the latter condition.

SYMPTOMATOLOGY AND DIAGNOSIS

The symptomatology and diagnosis of extra-uterine pregnancy can best be studied by sketching the *early* history of a so-called typical case (it being understood that typical cases are in the minority), and thereafter discussing the symptoms and physical signs which are presented with an estimate of their proper value in diagnosis.

In such a typical case uninterrupted menstruation extends over a period of years and is succeeded by a missed menstrual period, the cessation of menstruation being to the lay mind such conclusive evidence of pregnancy that the patient considers herself pregnant. Two or three weeks after the missed menstrual period, that is six or seven weeks from the last regular menstruation, the patient is conscious of a little pelvic pain upon one or the other side, and shortly after the onset of this pain there is a trivial menstrual flow. Since any sort of discomfort is expected by patients who are pregnant for the first time, no apprehension is excited by the pain so long as it is moderate and easily borne. The pain is usually colicky in character, it may be fairly sharp and last but a short time only to recur at intervals over a period of several days, and rather indefinitely corresponds in the time of its appearance to the menstrual "spotting." In from six to 10 weeks after the last regular menstrual period the patient is seized with very severe pain and faints, and simultaneously there appear other evidences of shock or hemorrhage or both. At this time the pulse becomes soft, usually very fast, but sometimes slow, the mucous membranes are blanched, and the temperature drops below normal. Within a few hours reaction occurs, the pulse becomes fuller, color returns to some extent, and as the air-hunger subsides the patient becomes quieter and more comfortable.

From this time on no set of symptoms can be considered typical, such a variety of events as may occur in the abdomen necessarily leading to a marked diversity of symptoms, but up

to the time of actual perforation, tubal rupture, or tubal abortion, a fair proportion of cases will present about the course outlined above.

An analysis of the signs and symptoms is perhaps best made by grouping them as follows, the term "rupture" as used, meaning perforation, tubal abortion or tubal rupture, each of these being associated with intra-abdominal hemorrhage: *Preceding rupture—at time of rupture—immediately following rupture—late extra-uterine—the fœtus dead, the fœtus alive.*

Preceding Rupture.—*Previous Sterility.*—The classical history of sterility is present in a fair proportion of cases preceding the occurrence of extra-uterine pregnancy, and if this sterility has existed over a number of years the evidence is of value by itself as it makes the probability of extra-uterine pregnancy greater, but fecundity is of no value whatever in excluding extra-uterine pregnancy, since the latter may occur in women who are bearing children regularly. In one instance the author operated for extra-uterine pregnancy upon a patient who was still nursing her last child. A history of sterility is of some weight, therefore, in a patient who presents other symptoms of extra-uterine pregnancy, but the absence of such history is without value. The sudden cessation of menstruation in a patient *who was previously regular*, and who has subjected herself to the possibility of impregnation, is one of the strong presumptive evidences of pregnancy, either intra- or extra-uterine. Should there be added to this a history of preceding sterility over a long period, a certain value is given to the mere skipping of one menstrual period if there is no other known cause for menstrual suppression. While normal pregnancy may take place after years of sterility, it is so unusual that this combination should lead one to regard the occurrence with suspicion. However, menstruation may be perfectly normal even though tubal pregnancy exists, so that regular menstruation is not conclusive evidence against early extra-uterine pregnancy, nor is regular menstruation any excuse for neglecting to take extra-

uterine pregnancy into account when any symptoms are presented which might lead one to suspect its existence.

Irregular Flow Following a Missed Menstrual Period.—A missed menstrual period by itself may mean much or may mean little, but the onset of a scanty flow, coming drop by drop, skipping a day or two and beginning again, two or three weeks after menstruation *should have occurred* is always significant of something. This something may be nothing more than a suppressed period due to any of the thousand and one causes of temporary suppression, but the occurrence of menstruation after ordinary suppression is so likely to be deferred but a few days, or else to occur at the proper time for the next menstruation, that its onset midway between the expected dates is full of significance.

Again, a missed period followed by intermenstrual spotting may be due to a threatened early abortion, and the passing of decidua would lend color to such a supposition, but decidua forms in the uterus though the pregnancy be tubal, and small shreds are almost invariably cast off in conjunction with the associated flow. This combination, sterility, a missed menstruation and recurrence of menstruation after six or seven weeks, together with expulsion of decidua from the uterus, is quite as good evidence of extra-uterine pregnancy as of early abortion.

Pain before Rupture.—Exceptionally there may be no pain whatever until the time of final rupture with its intense pain and profound collapse; more commonly, however, the patient has a little colicky pain on that side upon which the pregnant tube is situated. The pain is not constant and is of short duration. If it occurs in a patient who has never been pregnant, it may be explained to her mind by the presumed pregnancy, or if she thinks that pregnancy is impossible, the pain may be referred directly to the incident which she thinks is responsible for the suppression of menstruation. As the perforation in the tube grows larger and the hemorrhage from time to time becomes more severe, the attacks of pain are more serious in

character although usually short lived, but by themselves they may be sufficiently annoying so that the patient applies for examination before final rupture of the tube.

The combination of a missed menstrual period, irregular spotting, and recurrent colicky pain associated with the passing of shreds of tissue, has led to more than one curettage for presumed abortion, instead of which the most careful examination should have been made to exclude the possibility of ectopic pregnancy.

Physical Signs before Rupture.—Upon abdominal examination nothing distinctive is presented. There may be a little hyperæsthesia and rigidity over the affected side but nothing more.

Per vaginam some of the ordinary evidences of pregnancy may be found, a little purple discoloration below the urethra, slight softening of the cervix, and some enlargement of the uterus. Upon the side of the involved tube a very tender elastic mass is palpable on bi-manual examination providing the patient is not too sensitive. This mass is small, corresponds to the location of the tube, and is always *exquisitively sensitive to pressure*.

Thus it will be seen that the history of a missed menstruation, a little irregular flow, decidual discharge, and colicky pain, together with the results of a physical examination at this early period, simulate very closely an abortion with trifling ovarian inflammation. It is at this point that the history of preceding sterility is of such great significance, especially when combined with the positive knowledge that no attempt has been made to induce abortion. Sterility, followed by the other symptoms described and associated with exquisite tenderness of a tubal mass, pressure upon which reproduces the pain of which the patient complains, is so suggestive of extra-uterine pregnancy that an exploratory opening through the vaginal vault is indicated should it be required in order to confirm the diagnosis.

Should there be marked discrepancies in the history, no sterility, no missed menstruation, and no irregular spotting,

the diagnosis rarely will be made until one severe hemorrhage has taken place, but no patient who is presumed to have aborted should be subjected to any intra-uterine manipulation until a careful bi-manual examination has excluded tubal pregnancy.

Symptoms at Time of Rupture.—Usually some of the above-noted symptoms of tubal pregnancy will have preceded those now to be described. It is not at all necessary that all of them should have existed, the absence of one or more being quite common, and occasionally the first evidence of anything wrong is sudden collapse of the patient with symptoms of concealed hemorrhage. Much more frequently, however, the slight colicky pain has continued until, upon arising in the morning, going to the toilet, or lifting, there is excruciating pelvic pain during which the patient becomes faint or loses consciousness. At this time the extremities are cold, the visible mucous membranes are blanched, and the pulse is very soft and usually rapid, although it may sometimes be very slow.

At this point it must be remembered that the pain and collapse are not entirely due to loss of blood, but that they are partially dependent upon the shock of sudden extravasation of fluid into the abdominal cavity. That this is capable of producing all the symptoms of shock can be proven experimentally by pouring fluid into the abdomen of a non-anæsthetized patient.

Unless the blood loss is excessive reaction occurs within a few hours, and a latent period then ensues before the hemorrhage recurs. At the time of collapse the temperature is sub-normal, during reaction it may be markedly elevated although the patient is still anæmic and the hæmoglobin far below normal. This reaction temperature is analogous to the aseptic wound fever which follows any operation, and it confuses the picture customarily painted of ruptured tubal pregnancy.

Examination at this time often is rendered unsatisfactory by the extreme restlessness and confused condition of the patient's mind, even if she is not wholly unconscious.

The abdomen usually will be found tympanitic superior to a transverse line which corresponds to the upper level of effused blood. Marked flatness or even dullness below this line may not be made out, but just above it there is an area of marked tympany which shades off in both directions, up as well as down. Vaginally it may be possible to make out the slightly enlarged uterus with an indefinite sense of fullness above the posterior vaginal fornix, and a mass may be palpable at one or the other side of the uterus. Exquisite tenderness again is a startling feature even on gentle palpation. A few hours after the rupture, some clotting of the effused blood and the traumatic peritonitis about it makes the pelvic findings more distinct.

Each succeeding hemorrhage presents a picture corresponding to the first and differing only in its intensity, while the interval between hemorrhages is featured by improvement in the patient's condition.

Diagnosis at the Time of Rupture.—While intestinal perforation or strangulation may give raise to pain equally severe, and may be associated with shock and collapse, the evidences of internal hemorrhage are lacking. The surface of the body may be pale and cold, but the mucous membranes are not blanched nor the hæmoglobin so reduced as in hemorrhage.

Vomiting too is a prominent feature of strangulation, and although common enough in extra-uterine pregnancy, it is not one of the predominant symptoms of the latter.

The history of a menstrual anomaly which has led to the presumption of pregnancy after prolonged sterility, if followed by evidence of acute internal hemorrhage and pelvic pain, is sufficient to justify a presumptive diagnosis of ruptured extra-uterine pregnancy, and this diagnosis becomes positive if any of the above-enumerated physical evidences can be elicited.

If the hemorrhage and shock do not cause immediate death of the patient, a latent period may follow in which the pain persists although not so severe, the symptoms of acute anæmia

gradually subside, and the temperature becomes elevated, sometimes as high as 101° or 102°F. , while the pulse regains some of its normal quality. Menstrual spotting continues and portions of decidua may be discharged from time to time.

Abdominal examination at this time, a few hours after the first sharp hemorrhage, shows the same distinct line of tympany across the abdomen and the same hypersensitiveness over the lowermost portion of the anterior abdominal wall, and on vaginal examination there is an indefinite sense of fluid exudate in the pelvis, with or without a distinct palpable mass. Again, the diagnosis is almost positive even if the patient is not seen until reaction occurs, providing a history is obtained of a menstrual anomaly, supposed pregnancy, etc., followed by abrupt pain and fainting.

The latent period may last but a few hours or extend over several days when a recurrence of the hemorrhage may take place, followed by another rally, then another hemorrhage, reaction and relapse alternating so long as a living ovum is contained in the perforated or ruptured tube, and ending only with expulsion of the ovum from the tube or the death of the patient.

After Rupture, the Ovum Dead.—Should death of the ovum take place, the patient continues to have pain, but not of the acute type above described. The effused blood may clot and form a hæmatoma which is walled in by adhesions, the ultimate end in favorable cases being absorption of the clot. In other instances the blood fails to coagulate, absorption of only a portion taking place while the greater part becomes enclosed in adhesions at the bottom of the pelvis, thus giving rise to the encysted collection of fluid blood which is known technically as an hæmatocele. In favorable cases this will gradually absorb, or on the other hand it may become infected and give rise to a pelvic abscess with localized peritonitis.

Diagnosis at this time is dependent upon an accurate history in which pain, collapse, and acute anæmia are the significant

features, since examination reveals nothing but a semi-solid mass (the hæmatoma) or a fluctuating collection of fluid (the hæmatocele) in the recto-uterine excavation.

After Rupture, the Ovum Living.—Very exceptionally the ovum continues to live and go on to further development. In such cases the foetus is surrounded by the amniotic sac which encloses it as in normal pregnancy, but as this sac is unprotected by the muscular wall of the uterus it is easily ruptured when the placenta becomes partially or completely separated, and sudden

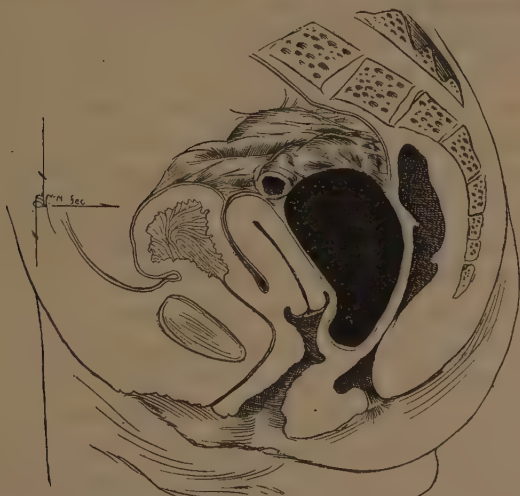


FIG. 208.—Extra-uterine pregnancy. Hæmatocele posterior to uterus due to walling in of blood which has not coagulated.

death of the patient may occur from the enormous hemorrhage which ensues.

It is rare that ectopic pregnancy goes to full term, and when it does the foetus is likely to be deformed or poorly developed. At the expiration of the usual nine months of gestation labor pains occur, after which the placental circulation ceases with the death of the foetus, which may either mummify, be converted into adipocere, or become infected, and give rise to general sepsis.

It is plain that while the symptoms may vary somewhat during this time, the evidences of pregnancy will continue so long as the foetus lives. Added to the ordinary symptoms of pregnancy, however, there is pain, not necessarily severe but of a type that does not accompany normal pregnancy. The abdomen enlarges, but the enlargement is not symmetrical, having its origin to one or the other side of the mid-line. In the middle three months of pregnancy examination will reveal the breast symptoms of pregnancy (always unreliable) and an enlarged abdomen, and bi-manually, the uterus while larger and softer than normal *does not correspond* in size and consistency to the presumed duration of pregnancy. To one side of the uterus will be found an elastic swelling which corresponds in size to the presumed duration of gestation, and under favorable circumstances ballottement may be made out in this sac.

As pregnancy proceeds, foetal motion and foetal heart sounds become noticeable as in normal pregnancy, but both are remarkably distinct, foetal motion appearing so plain as to give the impression that it is directly underneath the skin of the abdominal wall.

At the time of false labor the pains are in all respects like those of normal labor excepting that they are less severe and are protracted over a period of several days. With the onset of labor pains there is some "show," and pieces of decidua may appear in the uterine discharge. Examination at this time reveals the cervix somewhat softened, but still so much firmer than the cervix of a full-term pregnant uterus that suspicion should be aroused at once. If the uterus can be outlined at all in the tense abdomen it is found to be larger than normal, but quite plainly it does not contain the foetus. It is often impossible to feel the fundus and body of the uterus, and if there is a strong suspicion of extra-uterine pregnancy the introduction of the sound is justifiable, upon which it will be found that the uterus is but 10 or 12 cm. in depth.

It will be seen that after the first three or four months the diagnosis is comparatively easy if normal pregnancy, or normal pregnancy plus a pelvic tumor, can be excluded. The diagnosis of pregnancy having been established, whether it is intra- or extra-uterine can be determined by the exercise of a little patience, as no matter how thin the muscular uterus may be it undergoes alternate contraction and relaxation. Repeated abdominal palpation sooner or later will establish the fact that the foetal parts are contained in a contracting surrounding envelope in normal pregnancy, while if the foetus is outside the uterus no such alternating contraction and relaxation of its container takes place.

After foetal death the uterus itself becomes more plainly palpable, and there is but little difficulty in determining that the foetus lies outside the uterus.

Prognosis.—In a general way the prognosis has been given in the paragraphs devoted to clinical history and diagnosis, but in a more concrete form it may be said that the risk to life is a very distinct one, and that in every instance the patient is confronted by a protracted, painful, and dangerous illness. The risk of death from the first severe hemorrhage is not, however, so great as was at one time thought, this danger apparently being most marked if the site of rupture is in or near the uterine cornua.

The late Dr. M. Rosenwasser of Cleveland established this fact by a series of clinical observations and published his conclusions in the Transaction of the Ohio State Medical Society in 1893. Since that time other observers have arrived at the same conclusion, both from experimental and clinical observation. Unfortunately, however, they have undertaken to establish rules of treatment based on fallacious reasoning, these rules being more dangerous than those having their origin in the assumption that every patient in profound shock from ruptured extra-uterine pregnancy is in imminent danger of death.

TREATMENT

The treatment of ectopic pregnancy in the period preceding severe hemorrhage from rupture or perforation is plainly operative. No matter how much discussion may be indulged in regarding the propriety of operation during collapse, before that occurs there is no possible ground for difference of opinion. Salpingectomy should be done precisely as in chronic salpingitis, and a smooth easy convalescence is the rule. The ovary can and should be saved in most cases which are operated upon at this time. Some discussion, however, has been provoked by the proposal to remove both tubes to prevent a future pregnancy in the one remaining. The great percentage of instances in which this has occurred leads one to look with favor upon double salpingectomy, providing there is no objection upon the part of the patient and she is in such condition that the added time needed for removal of the second tube will not jeopardize life.

Treatment at the Time of Rupture.—A wordy battle has taken place concerning the proper treatment of extra-uterine pregnancy at the time of severe hemorrhage and collapse, the position of the extremists being about as follows: One school of gynecologists would operate at once regardless of the patient's condition, arguing that a large vessel is open and that the proper treatment for arterial hemorrhage is a ligature about the bleeding vessel.

At the opposite extreme are a number of surgeons who insist that the lowered blood pressure conduces to cessation of hemorrhage, that the bleeding will cease before death occurs, that when the abdomen is opened at this time the supposedly spurting vessel is never in evidence, that the patient will rally, and that so long as she continues to improve she should not be interfered with surgically.

The importance of the personal equation in establishing men's opinions should not be lost sight of in this controversy, the rapid

operators who use simple technique almost invariably holding to the former view, the slower surgeons with academic technique the latter. Obviously the second class can save more lives by following their conservative opinions than they could by operating during collapse. A patient who might die if the abdomen were open for an hour, will recover easily if the operation requires but 10 or 15 minutes.

The fallacy in both arguments lies in the presumption that it is the same vessel which bleeds at each succeeding hemorrhage, whereas it is more than likely that a new set is opened. Experiments upon pregnant cats and dogs, consisting of severing their ovarian arteries, are without weight, since the hemorrhage from an ovarian artery going to a pregnant uterus in no way resembles the bleeding from a perforated or ruptured pregnant tube.

The desirable method of treatment probably lies between the extremes. The conservatives have taught us that few die during the first collapse, the explanation lying in the fact mentioned before that this collapse is only partially due to the escape of blood from the systemic circulation, but in equal degree is due to peritoneal shock from rapid filling of the pelvis with blood. Should reaction not occur within a few hours, however, it means continued bleeding, and operation should be immediate. If a rally follows the collapse, operation should be performed at the earliest possible moment after reaction has set in, for no man can say when another hemorrhage will occur. It is the profoundly anæmic patient who has had repeated hemorrhages that succumbs to operation, not the one in a state of collapse from the first severe hemorrhage.

A good practical working rule for the surgeon to follow if the patient is in collapse, *is to operate as soon as proper arrangements can be made for operation.* During the time occupied in making such preparation, if the collapse is not kept up by continued hemorrhage, the patient will have rallied; if hemorrhage is continuous, nothing but operation will save her. If a competent

rapid operator and proper facilities are not at hand, the chance must be taken that hemorrhage will not recur until such time as both can be obtained. Hasty, imperfect preparation, followed by infection and death from peritonitis are in no wise better than delay and death from hemorrhage.

If circumstances render conservative treatment necessary, or in any event until operation is performed, the treatment should be that for collapse and hemorrhage *with the vessel still bleeding*. These measures are immediate lowering of the head of the bed, bandaging the extremities, absolute quiet, and the use of morphine in such doses as will relieve pain and restlessness and overcome apprehension. The use of saline solution subcutaneously, intravenously, or per rectum, is a measure of questionable value unless it immediately precedes operation. When the vessel is still bleeding saline infusion may cause death by raising the blood pressure and inducing further blood loss. If the bleeding has ceased it can do no harm, but it is absolutely impossible to determine this point with any exactness.

Strychnine and alcoholic stimulants may also do harm, the one by raising the blood pressure the other by favoring vasodilation.

Ice-bags to the abdomen and heat to the extremities are steps in the right direction even though their utility may be somewhat doubtful.

Operation at this time should be done expeditiously and simply, but with perfect regard for asepsis. Rapidity in operating should be secured by minute attention to all the necessary arrangement of details before the operation itself is begun.

Two objects are to be attained: the immediate control of bleeding, and the removal of the tube and ovum. To these ends the patient is anæsthetized with ether; chloroform here is dangerous, and nitrous oxide rigidity tends to prolong the operation. It is frequently found that the pulse improves as soon as etherization is begun. The Trendelenburg position favors rapidly in operating and is of value to the patient in maintaining

sufficient blood in the medulla. The abdomen is opened rapidly, one hand introduced, and the tube and ovary grasped and brought up at once; clamps are placed at either end of the broad ligament, the tube cut away, and the broad ligament tied beneath the clamps in one or two sections, whichever is easier. The clamps are loosened and removed as the ligatures are tied. No attention is paid to the intestine excepting to keep it within the abdomen, no pads are placed and no blood removed excepting as it wells up and obscures the field. Absolutely nothing more is done at this time; the other tube is not removed, the appendix is not sought, the abdominal cavity is neither sponged nor washed. One hand at the bottom of the pelvic cavity quickly removes any solid material or clots of blood which might contain the ovum, and the abdomen is closed without drainage, sometimes with blood pouring from it at each respiration, but this blood already is lost to the patient and no attention need be paid to it. If the condition is desperate through-and-through silkworm gut or silk sutures close the abdomen. If the patient is in good condition the usual method of closure is adopted. The after-care is that for the ordinary laparotomy with profound blood loss; saline solution subcutaneously or plain water per rectum now that further bleeding is not to be apprehended, elevation of the foot of the bed, and in extreme cases direct transfusion of blood. Convalescence is rapid and uneventful excepting that the temperature usually rises rather abruptly and remains up for several days.

Treatment after Rupture.—Operations *after the death of the ovum* as a rule are easy, even at full term. Within the first three months they consist in the removal of blood clot and extirpation of the entire sac after ligation of the broad ligament. Even if placenta has formed and spread beyond the confines of the tube, its removal after the foetus is dead is not followed by serious bleeding, but to deliberately wait for this is to lose some patients that might be saved by earlier operation.

The real test of surgical judgement and ability is found in

cases diagnosed after the end of the third month with the foetus still alive. Up to the end of five or six months there can be little question that operation is safer than waiting, but even during this period operation is rendered hazardous by the size and vascularity of the placental site.

After opening the abdomen a careful survey of the situation should be made with the object of determining if possible just what vessels supply the site of placental attachment. Ordinarily it will be found that the ovarian, and possibly the uterine, artery on the pregnant side furnish the most of the blood supply and these are readily controlled.

After completely walling off the upper abdomen the ovarian artery is secured at both ends of the broad ligament, the sac is opened, the foetus removed, and the cord tied. This is safer than attempting extirpation of the sac and contents intact as it gives better access to the bottom of the pelvis whence severe hemorrhage may proceed. The sac with the placenta should now be peeled from its site, tightly packed gauze replacing the placenta as it is separated. After extirpation of the sac, bleeding areas should be sought and controlled on general surgical principles, always remembering the proximity of the ureter and the risk of narrowing the intestine by the insertion of too many sutures in its wall. Very hot sponges and gauze tamponade usually control the bleeding sufficiently to permit the abdomen to be closed without drainage, but occasionally the necessity arises for leaving a gauze tampon applied to some large oozing surface.

Operations at this period never should be undertaken by one without ample experience in surgery. The exigencies of the case do not demand immediate interference and the tyro will more than likely lose his patient on the table from excessive blood loss.

After the fifth or sixth month, the foetus still living, the problem is to decide whether to allow pregnancy to go beyond term operating only after the death of the foetus, or to attempt to secure a viable child.

Inasmuch as the children that attain full term are so frequently deformed and defective, and the risk to the mother is so great, it would seem the part of wisdom to wait until the child is dead. Operations during the last two or three months of pregnancy are extremely bloody if the placenta is removed at the time of operation, and sepsis supervenes readily if the placenta is allowed to remain.

A month or so after false labor the sac and foetus can be removed like any other abdominal tumor, while the placental circulation has been so completely abolished as to lead to comparatively little hemorrhage when it is detached.

Vaginal Section in the Treatment of Extra-uterine Pregnancy.—A very skillful vaginal operator may remove a pregnant tube through the vagina, but the average surgeon should reserve vaginal section for diagnosis, in case the differentiation between extra-uterine pregnancy and inflammatory disease is not clear, and for the incision and drainage of old hæmatoceles and pelvic abscesses resulting therefrom.

Were it possible to diagnose rupture of the tube into the broad ligament with retention of blood between its layers, incision into the broad ligament base, followed by gauze drainage through the vagina might be practised. This diagnosis could rarely be made even if it were a common occurrence, which it is not. It is frequently described, but rarely seen, the peritoneum of the broad ligament undoubtedly yielding to the sudden influx of blood between its layers and so allowing free intra-peritoneal hemorrhage to take place even if the tube ruptures on its inferior surface.

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CHAPTER XIII

DISEASES OF THE OVARIES

Acute Oophoritis, Etiology.—Acute inflammation of the ovaries may be either septic or gonorrheal in origin. Septic oophoritis frequently results from infection of the uterus following abortion, full-term labor, or the use of unclean instruments. It may arise also from direct contact with virulent pus which has gravitated to the bottom of the pelvis during an attack of septic peritonitis from any source. The relation of septic oophoritis to infection of the cervix and body of the uterus is explained by their lymphatic connections, and is somewhat analogous, although not entirely parallel, to secondary involvement of the axillary lymph glands from an infected wound of the hand, the lymphatics in the broad ligament readily conveying micro-organisms from the uterus to the hilum of the ovary. Specific oophoritis is the result of the outpouring of irritating gonorrheal pus from the fimbriated end of the tube onto the surface of the ovary, and it is always secondary to specific salpingitis.

Clinical Course and Prognosis.—The clinical course of *specific* infection of the ovary is dependent upon its tubal origin and does not require separate consideration. The clinical course of *septic* oophoritis depends upon the character and virulence of the micro-organisms present. If the infection is mild and confined to the ovary, the clinical course is that of a very moderate localized pelvic inflammation and complete resolution may take place. Should an abscess form and be confined to the interior of the ovary, the end result may be an enlarged cystic ovary containing a thin serous fluid or inspissated pus. If the abscess ruptures before its contents become sterile, the

immediate result is an acute peritonitis which usually remains localized, but occasionally is of the spreading virulent variety. When peritonitis occurs peritoneal serum is poured into the pelvic cavity in large quantities, and if the infection is not too virulent this serum soon solidifies and forms a rampart of adhesions about the affected area. The products of suppuration tend to gravitate to the bottom of the pelvic cavity and in this way produce the well-known pelvic abscess, which, in favorable cases, will point in the direction of the posterior vaginal fornix. Such an abscess, however, may rupture into the bowel or bladder, or burrow through the surrounding adhesions into the general peritoneal cavity. Rupture into the vagina or bowel usually leads to spontaneous cure of the acute infection, but there remains an adherent enlarged ovary as in the milder infections without rupture of the abscess. After a time the contents of these cystic ovaries become sterile, but notwithstanding their sterility complete resolution does not occur if the infection has been virulent enough to produce an ovarian abscess. Rupture of a pelvic abscess through the surrounding adhesions into the general peritoneal cavity may be rapidly fatal.

Symptoms and Diagnosis.—If a correct history can be obtained, it is that of abortion, labor, or the introduction of instruments into the uterus, followed in a short time by the onset of pain on one side of the pelvis. If the infection is so overwhelming that the ovarian inflammation plays but a small part in a generalized process, the local symptoms may be unimportant and the diagnosis impossible. Nausea and vomiting may take place as they do in most abdominal infections with peritoneal involvement, and both the pulse and temperature are elevated. An increased leucocyte count is to be expected in every case in which the process is not so severe as to overwhelm the resisting power of the body, and an increase in the relative proportion of polymorphonuclear leucocytes is of both diagnostic and prognostic importance. As the result of a general pelvic

congestion, which is incidental to the inflammatory process, there is an increased prolonged menstrual discharge should the patient be flowing at the time of onset, and moderate intermenstrual bleeding may be caused in the same manner. On examining the abdomen there usually is some tympany superficial tenderness to pressure on the affected side, and more or less protective rigidity of the abdominal muscles over the pelvis, although this rigidity is not so marked as in peritonitis about the appendix, gall-bladder, or stomach. Dullness on percussion is absent early in the disease, but later it is sometimes found over large exudates.

Vaginal examination shows increased resistance of a very indefinite character together with extreme tenderness lateral to the uterus, and during the first few hours this may be the only evidence of disease which the finger can elicit. After two or three days peritoneal exudate in the recto-uterine excavation will be felt, and if the patient is not too sensitive, a mass can be made out at one side of the uterus on bi-manual examination. So far the local signs do not differ from those of specific salpingitis, excepting that the swelling is more likely to be limited to one side in septic oophoritis. Within a few days there is likely to be some remission in the symptoms, which may or may not be followed by a sudden and marked increase in their severity. This remission is explained by the walling in of the infected area about the ovary, and the sudden increase in symptoms by the rupture of adhesions or the cortex of the ovary itself, thus permitting infectious material to escape into unprotected portions of the pelvic cavity. Should the disease progress to the stage of pelvic abscess, marked bulging will be found in the recto-uterine excavation, and in late cases this extends almost to the vaginal outlet, while at a comparatively early stage in the formation of pus an area of softening may be felt posterior to the cervix. The symptoms are exaggerated and the physical signs modified if the infection takes place after full-term labor owing to the location of the ovary above the pelvic inlet at this

time, and inflammatory products which escape from its interior are more likely to cause general peritonitis. The rapidity with which absorption takes place through the peritoneum of the upper abdomen, as compared to the slow absorption through the pelvic peritoneum, tends also to render the symptoms more violent. Should virulent peritonitis not make its appearance, the exudate which forms is above the pelvic inlet and the ovary consequently becomes fixed much higher in the abdomen than it would if the uterus were normal in size. Indeed, it is not unusual to find the ovary adherent to the sigmoid on the left, to the cæcum on the right, or to the anterior abdominal wall on either side.

Acute septic oophoritis must be differentiated from appendicitis, ectopic pregnancy, and specific salpingitis. In making this differentiation an accurate history is of the first importance, and errors in diagnosis are inevitable if this cannot be obtained or is wilfully misleading. In acute appendicitis, epigastric pain, almost without exception, is the first indication of abdominal trouble, and is followed in a very short time by vomiting and fever, in the order stated. Shortly after the onset of epigastric pain, and coincident with the occurrence of peritonitis about the ruptured appendix, pain makes its appearance in the right iliac fossa or in the pelvis, but pain which was noticed first in the epigastrium, or elsewhere above the umbilicus, is so distinctly appendicular rather than pelvic in origin that the location of the earliest pain should be given great weight in diagnosis.

In specific salpingitis, which is so severe as to simulate septic oophoritis, a history of gonorrheal infection is almost always obtainable, a yellow leucorrheal discharge and bladder irritability following soon after marriage or suspicious intercourse. At this stage gonococci are usually demonstrable in the discharge from the cervix and urethra, and in addition, the fact that the pelvic infection is bilateral in salpingitis assists in differentiating it from acute oophoritis. Trivial intra-abdominal

hemorrhage from an *early* extra-uterine pregnancy may give rise to all of the symptoms of a mild acute oophoritis. Inter-menstrual bleeding is likely to occur in both, and irregular menstruation is likewise common to both. The elevation of temperature following a slight hemorrhage into the abdomen is usually not so high as the elevation in acute oophoritis. Protective spasm of the abdominal muscles, tenderness to external pressure, tenderness upon bi-manual examination, and a mass in the pelvis are likewise found in both diseases. One symptom that points to ectopic pregnancy rather than ovarian inflammation is the line of tympany which frequently makes its appearance above the effused blood. Profound shock and collapse at some time during the course of the illness is more common in extra-uterine pregnancy than in any other pelvic condition, as is the subsequent extreme degree of anæmia, neither of which are seen in acute oophoritis. A history of attempted abortion does not always clear up the diagnosis, as many patients who are the victims of ectopic pregnancy believe themselves to be normally pregnant and introduce instruments into the uterus with the intention of inducing abortion. The sensation conveyed to the finger by exudate about an inflammatory focus differs from that produced by effused blood, because peritoneal exudate solidifies, while blood undergoes clotting only, and the consistency of each is quite characteristic.

A mistake in diagnosis as between specific salpingitis and septic oophoritis is almost unavoidable in those rare cases in which gonorrhea has remained latent in the cervix or about the vulva during pregnancy, only to become acute and extend to the body of the uterus and thence to the tubes soon after abortion or labor.

Treatment.—In an individual case an error in diagnosis may do no harm, but on the whole the correct treatment of acute ovarian infection is dependent upon a correct diagnosis. The treatment of acute appendicitis and the treatment of ectopic pregnancy are essentially the same, operation upon diagnosis,

while that of acute oophoritis is dependent upon the extent of the pathological change and not upon the fact that an infection of the ovary exists. Palliative treatment should be practised in those mild cases in which the infection is confined to the ovary, with possibly a trivial local peritonitis and small amount of exudate, absolute rest in bed being the most important consideration. For the relief of pain ice-bags over the pelvis, or counterirritation followed by the application of moist heat are usually sufficient, the choice between heat and cold being somewhat dependent upon the sensations of the patient. There is no objection to the use of narcotics in small doses if they are necessary to make the patient comfortable, providing always that they are not continued beyond the acute stage of the disease, and their constipating effect is overcome by means of enemas. Cathartics do no harm if the infection happens to be confined to the interior of the ovary but are productive of damage when peritonitis is present. The bowels of course are to be kept open, but this should be accomplished by enemas instead of drugs, the routine dose of calomel and salts, so frequently given at the outset of any intra-abdominal infection, being fraught with great danger. Local applications to the vagina in the form of tampons, douches, etc., should be avoided during the acute stage as they do no good and seriously interfere with the first desideratum which is perfect rest.

Acute oophoritis of a severe type, in which fluid appears in the recto-uterine excavation at an early date, should be treated by vaginal incision and drainage, as by so doing the extension of infection to the upper portion of the abdominal cavity can be prevented in most instances. While drainage of the cul-de-sac only may be sufficient, it is wiser to make a distinct operation of this simple procedure so that the ovary can be palpated by a finger introduced through the incision. When the ovary is found to be enlarged and fluctuating, it should be perforated to permit drainage of the primary focus in its interior.

The influence of the sitting or semi-sitting position in causing

septic peritoneal fluids to gravitate to the bottom of the pelvis may possibly be open to question when the abdominal cavity is closed. There is no doubt of its advantage, however, when an opening exists in the most dependent portion, and patients with pelvic peritonitis should be placed in this position for the first day or two after operation if the condition of the heart permits. The rapid formation of adhesions about the infected area and about the drainage material makes it unnecessary to continue the sitting posture for more than 48 hours.

In cases midway in severity between the two just mentioned, that is, those in which considerable exudate forms but the patient is not desperately ill, interference should not be practised during the acute stage unless a point of softening makes its appearance in the mass of hard exudate which is palpable through the vaginal fornix. Such cases translate themselves into pelvic abscesses and should be treated as such.

After labor at term the high location of the ovaries makes it impossible to reach them through an opening in the vagina, so that when drainage is necessary the incision must be made through the anterior abdominal wall and over the area of induration. Any evidence of rupture of the infected ovary, or a serious degree of peritonitis, should be met by prompt laparotomy, because involvement of the abdominal peritoneum is so much more serious than that of the pelvic, and adhesions about the infected area are less likely to form before serious damage has occurred. It is in cases of this kind that an ovary sometimes must be removed, although thorough walling off of the healthy peritoneum and adequate drainage of the ovary itself frequently results in complete recovery so far as the acute infection is concerned. Even after bilateral involvement complete resolution is possible and may be followed by subsequent pregnancy, but such is not the usual outcome. On the contrary, an enlarged cystic ovary usually remains, and, although the infection has so far disappeared that the patient's life no longer is in danger, the constant pain leads her ultimately to undergo removal.

of the organ rather than be made a semi-invalid by the pelvic discomfort.

Prolapse of the Ovary.—The term “prolapse of the ovary” implies that the organ has fallen below its normal level in the pelvic cavity. The cause may be increased size and weight of the ovary, relaxation of the ligaments which normally support it, or a posterior displacement of the uterus which carries the ovary with it. It is not certain that prolapse *per se* is productive of any symptoms, but it is true clinically that most

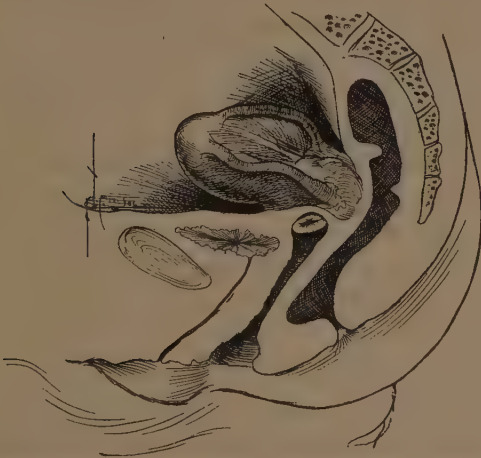


FIG. 209.—Both ovaries prolapsed to bottom of recto-uterine excavation.

patients with a marked degree of ovarian prolapse have symptoms which, either directly or indirectly, are referable to the displacement. When the ovary falls to the bottom of the recto-uterine excavation the irritation of hard fecal masses, injury during coitus, and the pressure of a displaced uterus are all productive of pain. An *inflamed* prolapsed ovary gives rise to an extraordinary amount of pain which may be referable partly to its location and partly to the inflammatory condition. Should the ovary become adherent in its abnormal location the above-mentioned traumatic influences are productive of more

severe symptoms than they are when the ovary is so freely movable that it slips away from any direct pressure which may be applied to it. The diagnosis is easy. On bi-manual examination one or both ovaries are found to be absent from the normal location, while a body or bodies corresponding to the size and shape of the ovary are found in the cul-de-sac, and these almost without exception are hypersensitive to pressure. If not fixed by adhesions, a prolapsed ovary may be readily returned to its normal location but immediately drops back to its former position. Pressure upon a prolapsed hypersensitive ovary produces nausea and a peculiar sickening sensation similar to that caused by pressure upon the male testicle. When a prolapsed ovary is adherent it may be impossible to map it out as a single organ, but under these circumstances its position is of little importance compared to the inflammatory process by which it became fixed in its abnormal location.

Treatment.—While prolapse of the ovary may not *per se* require any treatment, prolapse combined with the diseases with which it usually is associated needs some form of intervention.

If prolapse of the ovary co-exists with retrodisplacement of the uterus, the return of the latter to its normal position followed by the mechanical support of a pessary may be all that is necessary. Often, however, the ovaries remain in their abnormal position when the uterus is replaced and the pessary is not well borne because its posterior bar impinges upon them. In this event even a freely movable uterus may require operation, and when such is the case, the mal-position of the ovary should be corrected by shortening the infundibulo-pelvic ligament or attaching the ovary to the horn of the uterus by the utero-ovarian ligament, either of which will suffice to retain it in its normal position. A prolapsed adherent ovary does not necessarily need removal. Unless it is markedly enlarged and cystic, its release from the surrounding adhesions and attachment higher up in the pelvic cavity by one of the above methods

renders excision unnecessary. In elective operations of this kind, that which shall be done with one ovary is often contingent upon the condition of the other. If one ovary is perfectly healthy, the sacrifice of the other is no hardship to the patient; if both are in questionable condition, every possible effort should be made to conserve the better of the two.

OVARIAN TUMORS

Tumors of the ovary frequently are classified as benign and malignant, but the dividing line often is too indefinite to permit such classification. They are also classified as solid and cystic, but again this is by no means accurate. The best classification is that proposed by Pfannenstiel into stromatogenous and parenchymatogenous tumors. Tumors arising from the stroma are fibromata and sarcomata. Those arising from the parenchyma take their origin either from the germinal epithelium or from the vesicular ovarian follicles. The parenchymatous tumors are retention cysts, corpus luteum cysts, dermoids, papillomata, cyst-adenomata, and carcinomata. Nearly a third of the cystic pelvic tumors, which are loosely called ovarian cysts, arise from the epo-oophoron and really are parovarian cysts. The ultimate etiology is not known, but all ovarian tumors are said to be more common in child-bearing women. The carcinomata are largely due to degenerative processes in other ovarian tumors, or else are secondary to carcinomatous growths elsewhere in the abdominal cavity.

Pathology.—The pathology of the fibromata and sarcomata does not differ from that of similar growths elsewhere. Unlike fibroma and sarcoma, and unlike carcinoma in general, carcinomatous tumors of the ovary are sometimes cystic, the fluid apparently being produced by the activity of the secreting epithelium composing the greater part of the malignant growth. Retention cysts usually are small in size, and while it is true that the etiology of most ovarian growths is unknown, this state-

ment should be modified in the case of retention cysts to the extent of saying that in all probability they are due to thickening of the tunica albuginea. The cyst wall about the ovarian follicle therefore fails to rupture, while the epithelium which lines the follicle continues to secrete fluid until such time as the pressure of the fluid within produces pressure atrophy of the epithelial lining, when the cyst ceases to grow. This form of tumor is

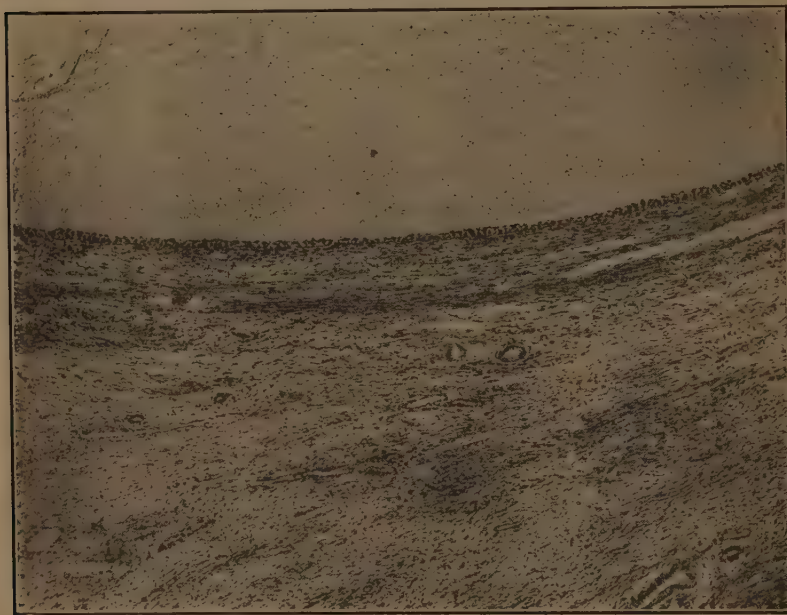


FIG. 210.—Simple cyst of the ovary, retention cyst, cystic follicle.

comparatively frequent as a sequel of acute oophoritis. Corpus luteum cysts also form in consequence of the failure of the corpus luteum to pursue its ordinary physiological course, while the secretion of fluid continues in its interior. Corpus luteum cysts are small in size and frequently have a layer of lutein cells as their innermost lining.

Ovarian dermoids are the most interesting tumors in the body. In their simpler forms they, like dermoids elsewhere, appear to

be due to inversion and proliferation of the epiblastic cells, which are principally epithelial, but many ovarian dermoids are more complicated in their structure and contain tissues derived from all three of the primitive embryonic layers. At present the consensus of opinion seems to be that all ovarian dermoids are parenchymatous, and that they originate in some direct manner from the ovules. These tumors rarely are excessive in size and occasionally are bilateral. They are semi-fluctuating when *in situ*, but after removal they become firmer from the hardening of their sebaceous contents under the influence of the lower temperature outside the body. Their contents consist of sebaceous material, hair, teeth, and, in the parenchymatous form, portions of other tissues and even organs. The hair is found in the form of a ball or switch in some tumors, and in others as a short stubby growth. Careful examination of cyst-adenomata reveals the fact that many of them contain a small dermoid. The fluid and sebaceous contents of a dermoid are formed from the epithelium which lines its interior. The cyst wall usually is quite thin and is largely made up of connective tissue, the outer covering of the tumor being that of the ovary itself.

Papillomata, in addition to the ordinary structures which make up an ovarian cyst, contain warty or finger-like excrescences growing into their interiors. They are usually unilocular and contain serous fluid into which project the irregular masses of papillomatous outgrowth. So long as these projections are inward only the tumors may be considered as clinically benign, but unfortunately they sometimes erode through the tumor, or grow into the abdominal cavity from the external tumor wall, whence by constant proliferation they become attached to other organs. When this occurs they are clearly malignant, and their removal is almost certain to be followed by recurrence. The papillomatous excrescences are composed of a stroma of connective tissue which contains blood-vessels, and they are covered on their outer surface by epithelium of the columnar variety.

All the foregoing varieties of ovarian tumor are met with from time to time, but they are relatively infrequent as compared to the cyst-adenoma which is the common type of ovarian cyst.

Cyst-adenomata usually are globular in form although the

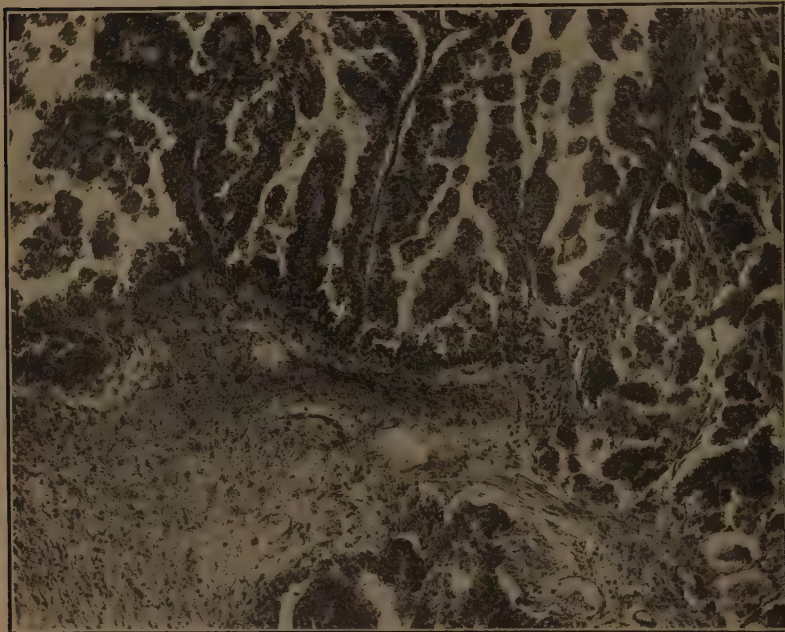


FIG. 211.—Papilliferous cyst-adenocarcinoma. Developing in a papilliferous cyst-adenoma of the ovary. In the upper central part of the field are to be seen many papilliferous epithelial outgrowths from the wall of a cyst without much infiltration of the basement membrane surrounding this cyst wall, but at the right the epithelial cells are broken up into numerous small groups infiltrating the stroma. Here the basement membrane of one of the cysts has been broken through and the epithelial cells are growing atypically throughout the stroma. This tumor showed a very definite change to the adeno-carcinoma type.

rapid growth of adenomatous masses may render their exterior somewhat knobbed, like uterine fibroids. The older portion of the cyst is distinctly fluctuating unless its wall is very tense, while the newer portion may be quite firm in consistency. The exterior is usually a light bluish gray in color. The cyst wall

is composed of connective tissue which is covered externally by the epithelial covering of the ovary proper, and internally by the secreting epithelial cells whose activities produce the fluid contents. Cyst-adenomata with but few exceptions are multilocular, and while pressure atrophy occasionally may cause the walls between the locules to undergo degeneration and finally

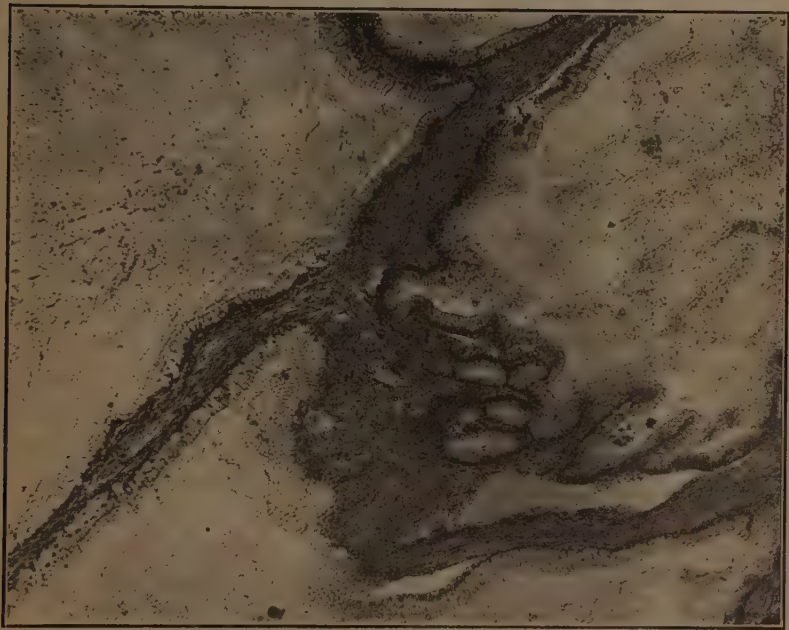


FIG. 212.—Multilocular cyst adenoma simplex of the ovary. The microphotograph shows the pale simple columnar epithelium with its tall cells, the strands of tissue made up of ovarian stroma and proliferating connective tissue, and the granular, stringy pseudo-mucin filling the cystic spaces.

rupture, evidences of such subdivision usually can be found. The contents of cyst-adenomata vary in color, and one may see a single tumor one of whose locules contains almost colorless fluid, another yellow, and another dark brown or chocolate-colored material. The variations in color depend somewhat upon the quantity of fluid but more upon the presence or absence

of blood. Most cyst-adenomata contain quantities of mucin which gives a gelatinous appearance to their contents.

A cyst-adenoma is a proliferating tumor, and the formation of fluid in its interior does not cause sufficient pressure on its walls to check the secretion of those cells which are responsible for the continued increase in its contents. It therefore grows indefinitely and ultimately attains an enormous size.

The pedicle of a true ovarian tumor is composed of the drawn-out broad ligament, the utero-ovarian ligament, the infundibulo-pelvic ligament, and usually a portion of the tube, together with those blood-vessels and lymphatics which enter the hilum of the ovary. The pedicle, therefore, is covered by peritoneum, while the tumor itself is covered only by the epithelial coat of the ovary which is not peritoneal in character. Occasionally a true ovarian cyst is found whose expansion carries it toward the broad ligament rather than into the peritoneal cavity. While such a tumor is never completely invested by peritoneum, that portion of it which has grown in immediate proximity to the hilum of the ovary may be, because of its having pushed between and spread out the layers of the broad ligament over the ovarian attachment at the hilum.

The nature of their outer coat serves to distinguish the true ovarian cysts from parovarian cysts. Parovarian cysts originate from the epo-oophoron (parovarium) in the broad ligament, and primarily are retention cysts of Kobelt's tubules. They are contained between the folds of the broad ligament and thus are covered by peritoneum. As retention cysts only, they are small in size, but overactivity of the epithelial lining of the tubules may be productive of a large thin-walled sessile growth. The tube is drawn over the top of a parovarian cyst, while its base extends to the base of the broad ligament from which its blood supply is derived.

The wall of a parovarian cyst is thin, and is composed of connective tissue covered externally by the peritoneum of the

broad ligament and internally by the secreting epithelium from which its serous contents are derived.

Clinical Course and Prognosis of Ovarian Tumors.—The sarcomata and carcinomata behave here as elsewhere in the abdominal cavity. They grow rapidly, extend to other organs at an early date, produce ascites, and give rise to metastases. A partial exception to the rule of early extension may be found in those carcinomata which are secondary to other ovarian tumors, and whose early extension is delayed by the fact that they grow within the interior of the tumor and thus remain encapsulated for a considerable time. Untreated carcinomata and sarcomata invariably are fatal.

Dermoids may be found at any age. They grow slowly and rarely attain great size but are subject to the accidents which are detailed elsewhere. Serous cysts of any size may rupture, either spontaneously or through the medium of some trivial accident, and such rupture is without serious consequence unless the tumor is a cyst-adenoma or papilloma, when implantation metastases may occur. Spontaneous or accidental rupture does not lead to cure as the cyst contents rapidly re-accumulate. Cyst-adenomata progress indefinitely, attain a huge size, and if not removed are almost as surely fatal as true malignant growths.

Papillary tumors stand midway between malignant and benign growths. Should the papillomatous masses remain confined to the interior of the tumor, the patient's life is endangered by the size of the growth only. Should such a tumor rupture, or the papillomatous outgrowths perforate the capsule and extend into the abdominal cavity, it is no less malignant than a sarcoma or carcinoma.

Accidents.—An ovarian tumor is liable to a number of accidents. Its outer surface may become inflamed, its interior may be infected and suppurate, and a pedunculated tumor may undergo torsion with sufficient twisting of its pedicle to interfere with the blood supply and cause gangrene.

Inflammation of the outer surface of an ovarian tumor is indicative of a mild localized peritonitis. This is of no particular moment at the time of its occurrence, but the resulting adhesions may seriously complicate an operation undertaken for the removal of the tumor at a later date. It is characterized by slight elevation of temperature and localized pain and tenderness, both of which subside in the course of a few days.

Suppuration of an ovarian cyst is a rare accident, and when it occurs is likely to be associated with typhoid fever. It is characterized by abdominal pain, *rapid increase in the size of the tumor*, sudden elevation of pulse and temperature, and *leucocytosis*. Although suppuration is rare its diagnosis is not difficult if a patient with typhoid fever or other general infection is known to have an ovarian tumor, but should the tumor be small and its presence unknown, the diagnosis is not so readily established. A combination of abdominal pain, leucocytosis, and septic symptoms during or after typhoid always means an intercurrent infection of some sort, and if the patient is a woman, the absence of an ovarian tumor should be definitely established before a diagnosis of appendicitis, cholecystitis, or intestinal perforation is made. The treatment of this accident is a grave matter. With a large cyst undergoing suppuration and a patient already reduced by serious illness, ovariectomy is a desperate procedure. Rupture of the tumor during its removal, or soiling of the abdominal cavity by its infected contents, almost certainly leads to death. Under such circumstances it may be necessary to open the abdominal cavity under local anæsthesia, wall off an area immediately beneath the incision, and allow adhesions to form for 24 or 48 hours, after which the tumor can be tapped and drained. This is an imperfect procedure and should not be resorted to save in the direst extremity, but in desperate cases it may be life saving. When the tumor is small and the patient in reasonably good condition, rapid removal without tapping offers the most hope of relief.



FIG. 213.—Drawn from specimen of torsion of pedicle of an ovarian cyst.

Torsion of the pedicle of an ovarian tumor takes its place among the abdominal catastrophies. The symptoms are intense pain, profound shock, and marked tenderness to pressure over the location of the tumor, followed after a short time by evidences of severe peritonitis. Usually there is vomiting, and when this is present the symptoms of acute intestinal strangulation are very closely imitated. The diagnosis is readily established when a patient who is known to have an ovarian tumor develops the foregoing set of symptoms; and whenever a woman presents the symptoms of intestinal obstruction the absence of an ovarian cyst should be definitely determined, although the treatment is the same in either event, viz., immediate operation.

Upon opening the abdomen of such a patient the tumor will be found discolored, blue if venous return only is interfered with, black if the circulation is completely cut off. A moderate degree of torsion of the pedicle which is sufficient to interfere with the venous return only, causes a much more rapid increase in the size of the growth than does torsion so complete as to interfere with both the arterial supply and the venous return. In the latter event there is likely to be a very deceptive remission in the symptoms between the time when gangrene occurs and septic peritonitis begins.

The removal of an ovarian tumor with torsion of its pedicle does not differ from the performance of ovariectomy under ordinary circumstances, excepting that the tumor should not be tapped and its pedicle should be ligated well below the thrombosed area.

Symptoms and Diagnosis of Ovarian Tumors.—Aside from the pain caused by retention cysts and the pain associated with malignant tumors which have involved the peritoneum, the early subjective evidences of ovarian tumors may be surprisingly trivial if none of the accidents occur. The only complaint which the patient makes may be that of a sensation of fullness in the lower abdomen, and the diagnosis depends entirely upon

the results of a physical examination. Upon inspection of the abdomen it will be found prominent in proportion to the size the tumor has assumed; in the small tumors no change is appreciable upon inspection, in those of moderate size there will be a fullness in one or the other hypogastric region. Upon palpation of a large ovarian tumor there is felt a distinct, semi-elastic, rounded, mass, which usually is regular in shape but may be lobulated. When the tumor is small it will be found to one side of the pelvis, but later it occupies the mid-line unless it has contracted adhesions in its original location. Percussion directly over the tumor gives a flat note, although coils of intestine may overlie it when small and remain between the tumor and abdominal wall if they become adherent, in which event there will be local areas of tympany. At either side of the growth percussion gives a resonant note unless ascites co-exists. Fibromata, sarcomata, and carcinomata are, however, almost invariably accompanied by ascites, when the absence of resonance at the sides is of no value. Auscultation is without result. Upon bi-manual examination the tumor is perceptible to the vaginal finger unless it happens to be adherent high in the abdomen. The uterus can be made out in front, behind, or at one side of the tumor, and occasionally a distinct pedicle can be palpated. If the tumor is cystic and not too tense, a sense of semi-fluctuation can be obtained between the fingers in the vagina and the hand upon the abdomen, and, if of moderate size and not adherent, it will be freely movable. When, on the contrary, the growth is very large, the tension of the abdominal wall may be sufficient to prevent motion being conveyed to it by the vaginal finger, and if the tumor is one of the solid varieties no fluctuation or sense of elasticity can be obtained. Parovarian cysts, contrary to the rule with true ovarian tumors, are not movable.

The differential diagnosis of a *small* ovarian tumor is easy, and it is almost impossible to mistake it for any other tumor excepting a pedunculated fibroid or a hydrosalpinx. Its painless

character, and in other than adherent retention cysts, its free mobility, scarcely allows it to be confused with any other pelvic disease. Occasionally a hydrosalpinx presents all the characteristics of a small ovarian cyst and it may be impossible to differentiate one from the other, but such differentiation is of importance from a prognostic standpoint only as both require operative treatment.

With the larger tumors, however, a number of conditions may be confused, the principal ones being pregnancy, large fibro-myomata, ascites, and late tuberculous peritonitis.

It cannot be repeated too often, that the pregnant uterus is the most common source of abdominal enlargement in women throughout the child-bearing age. While the differentiation of a pregnant uterus from an ovarian tumor usually is easy, conditions sometimes arise which render it extremely difficult. Should a tumor occur in a young girl, that is, two or three years before puberty, or if it presents itself in a woman several years beyond the menopause, no thought of pregnancy need be entertained, but during the child-bearing age pregnancy must always be considered. On inspection of the abdomen both present a midline enlargement, symmetrically rounded, and shading off at the sides. On palpation an elastic mass can be felt in both conditions, regular in shape, and extending from the pelvis upward into the abdomen. The pregnant uterus is always smooth and an ovarian cyst usually so. Ordinarily the cyst is the tensor of the two, but if the hand remains flat upon the abdomen for a sufficient time the pregnant uterus can be felt to undergo alternate contraction and relaxation, in which the uterus differs from any abdominal neoplasm, and from any other abdominal organ excepting an obstructed stomach or intestine.

On percussion the results are similar in both cases, flatness over the enlargement, tympany at both sides and above it.

Should the tumor be as large as a seven months' pregnant uterus, auscultation reveals one positive finding in pregnancy

which is absent in ovarian cysts, viz., the uterine bruit synchronous with the maternal pulse rate. If the foetus is living, the foetal heart also should be audible at and beyond this period, and if the examination is prolonged, foetal motion should be both heard and felt.

Upon inspecting the vulva during pregnancy the characteristic discoloration is visible, and after three or four months is almost unmistakable. No discoloration is present in ovarian tumors unless they are adherent and impacted. The cervix in pregnancy feels soft to the touch, in ovarian tumors normal.

On bi-manual examination the enlargement of pregnancy is an integral part of the uterus, while the uterus usually can be outlined somewhere outside an ovarian tumor.

In pregnancy some of the foetal parts ordinarily can be outlined on bi-manual examination and motion will be felt if the foetus is alive, but an occasional case of hydramnios is encountered in which the tension of the uterine walls, together with an excessive quantity of fluid, obscures this sign.

The patient's history adds some weight but is not always reliable, as menstruation may continue or be said to have continued during pregnancy, and may cease when the patient has a huge ovarian cyst. The breast signs of pregnancy are equally unreliable, colostrum appearing in various pelvic disorders as well as in pregnancy.

The sound may be used in instances of grave doubt when immediate diagnosis is demanded, but only under such circumstances is it justifiable as pregnancy is always diagnosable by its ultimate termination in labor.

The differentiation of large fibro-myomata of the uterus from tumors of the ovary is not so important as is the exclusion of pregnancy, as the treatment of both is operative, but the prognosis of the two is by no means similar. For the sake of a definite prognostic statement as well as in the interest of scientific accuracy this differentiation should be made when possible,

and the reader is referred to the section devoted to fibromyomata for the differential points.

Between ascites and ovarian tumor the points of similarity are few, and one might say that the only resemblance lay in there being an ill patient with an enlarged abdomen. The fluid in ovarian cysts is enclosed in a capsule, in ascites it is free; but ovarian fibroids, carcinomata and sarcomata have ascites associated with them when the physical signs both of ascites and a tumor are present. Upon change of position a movable area of dullness is characteristic of ascites, and while ovarian tumors move on change of position, they move as one mass and not as free fluid with intestine floating upon its surface.

It should not be assumed that the ascites arises from some general disease unless heart, kidney, liver, or advanced lung lesions are present. Tuberculous peritonitis may simulate an adherent ovarian tumor, but elevation of temperature, a persistently fast pulse, and emaciation all point to tuberculous peritonitis rather than ovarian tumor.

Treatment.—The treatment of ovarian tumors is surgical. Small retention cysts and corpus luteum cysts can often be removed by resection of the ovary, but complete excision is demanded for all others.

Occasionally a parovarian tumor may rupture and not refill, but as a rule their treatment is the same as that of the true ovarian cysts.

OPERATIONS UPON THE OVARIES

A retention cyst or a corpus luteum cyst of one ovary may be treated by removal of that ovary if the other is normal, but resection is the operation of choice when both ovaries are involved.

Resection.—After the abdomen is opened the intestine is packed away from the lower pelvis with gauze pads, both to prevent soiling if the cyst should rupture and to obviate constant handling of the bowel. Most retention cysts are the

aftermath of acute oophoritis and are therefore adherent to the broad ligament, intestine, or floor of the pelvis. The adhesions which bind the ovary to these localities are separated gently, and the ovary is drawn to the surface. A wedge-shaped excision of all the affected area is then made and the flaps united with interrupted sutures of fine silk or catgut, applied just tightly enough to control bleeding. No sutures should be



FIG. 214.—Resection of ovary. A wedge-shaped excision of all the affected area is made.

placed upon the broad ligament external to the ovary for fear that deprivation of its main blood supply will cause further degeneration and subsequently necessitate a total removal of the organ.

Ovariectomy.—Ovariectomy was the earliest routine abdominal operation undertaken deliberately with the object of curing a hitherto incurable disease.

In the absence of adhesions the operation is easy and the technique simple, especially if the tumor is of moderate size.

The abdomen is opened by a short incision at or near the mid-line, and the relations of the tumor ascertained with the finger. If no complications are present the incision is lengthened sufficiently to permit the tumor to be lifted out of the abdominal cavity, which is at once protected by gauze pads

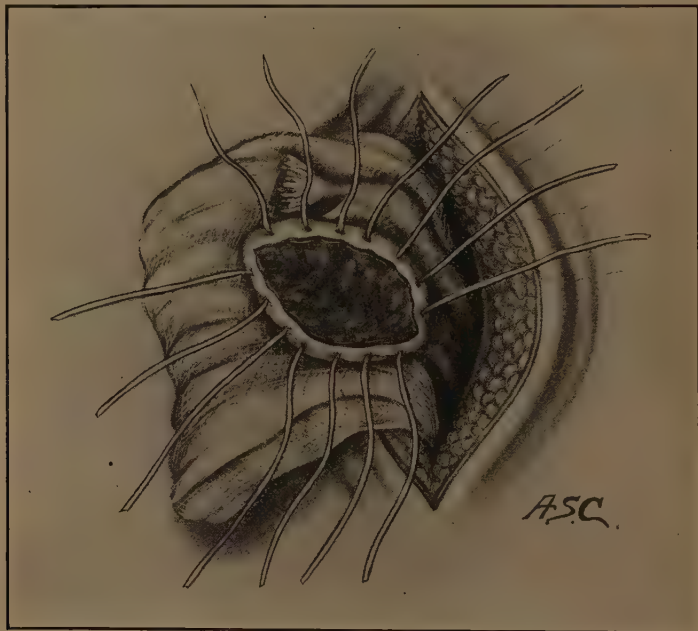


FIG. 215.—Resection of ovary. Sutures in place but not tied.

tucked under the edges of the incision in sufficient number to retain the intestine and protect the peritoneum from drying through contact with the air. The pedicle is now clamped or ligated and the tumor cut away at such a distance from the tumor that none remains in the stump, but sufficiently far from the clamp or ligature so that retraction of the vessels is impossible. Temporary control of the pedicle by clamping

is safer than immediate ligation, as after removal of the tumor the ligature is sometimes found to be loose, or to contain too little of the stump distal to the tie to be safe.

If the pedicle is small, one ligature of medium-sized silk applied immediately proximal to the clamp and drawn tight as the clamp is loosened is entirely satisfactory, as it slips into the groove made by the clamp and renders retraction of the vessels

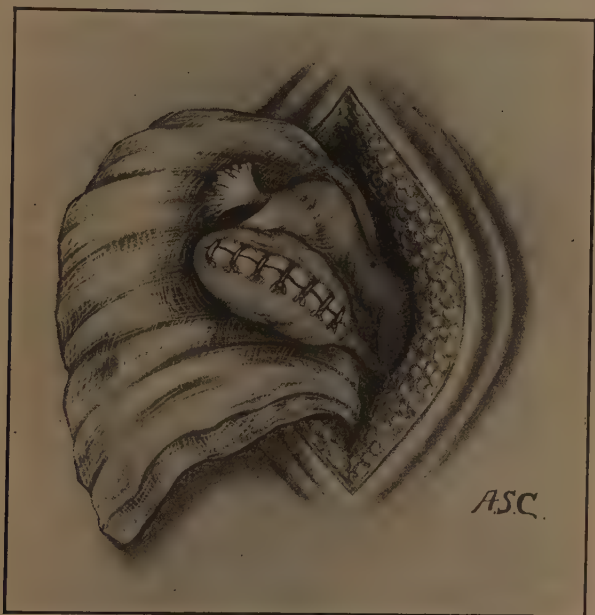


FIG. 216.—Resection of ovary. Sutures tied just tightly enough to control bleeding. No sutures at broad ligament.

impossible. For thicker pedicles many methods of ligation have been advised, but any method is safe which controls the vessels after the stump is returned to the abdomen.

A satisfactory plan is to perforate the pedicle immediately behind the clamp and tie it in halves, one tie then being thrown around the entire stump, always remembering to loosen the clamp as the first turn of the knot is drawn down.

If greater security is desired the latter part of this ligature may be made as a suture which takes a thin bite of peritoneum

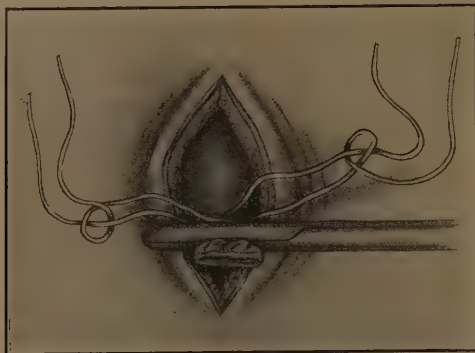


FIG. 217.—Ovariectomy. Clamping and tying pedicle in halves.

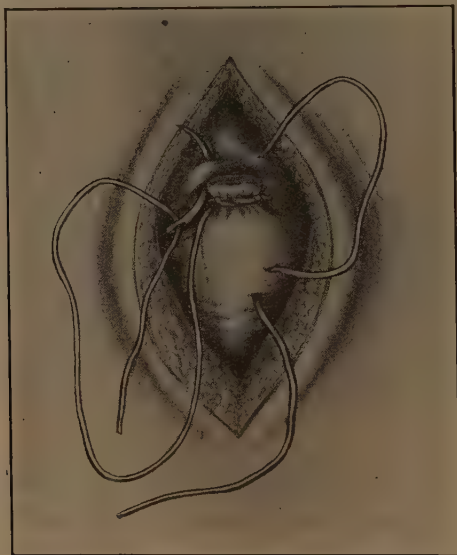


FIG. 218.—Ovariectomy. "The latter part of this ligature may be made as a suture."

once or twice as it encircles the pedicle, and absolute safety is attained by picking up and tying each vessel after the main



FIG. 219.—Ovariotomy. Adhesions may be prevented by "burying the stump with a purse-string suture."



FIG. 220.—Ovariotomy. The stump buried.

ligature has been applied. The raw end of the stump sometimes contracts adhesions. This can be prevented by burying the stump with a purse-string suture placed on the pedicle proximal to the main ligature.

The peritoneal toilet, so frequently mentioned in the early descriptions of ovariectomy, is unnecessary unless a cyst has ruptured during the operation. In this event the fluid is sponged out at once and the soiled area carefully gone over with wet sponges. The contents of ovarian cysts are sterile, but small adenomatous or papillomatous masses may graft themselves upon the peritoneum and multiply as independent tumors, while it is almost impossible to remove the sebaceous material of a dermoid from the peritoneum and saprophytic infection and fatal peritonitis may be the outcome.

Technique in the Presence of Adhesions.—Adhesions of the omentum to the growth are gently separated if they are recent, or tied and cut between ligatures if old and dense. The intestine is packed away from the location of the tumor so far as the adhesions will permit, and the latter are separated by the sense of touch alone so long as the dissection is easy and in safe territory. Adhesions to movable coils of intestine are better separated under the guidance of the eye, and if they are very dense the outer layer of the tumor wall should be left attached to the viscera rather than to denude the latter of their peritoneal covering. Should the cyst rupture during these maneuvers its contents are carefully sponged away and the now collapsed cyst wall is drawn up out of the incision, where the separation of adhesions is continued. The abdominal cavity above and about the site of operation should be most carefully walled off by gauze packs, so that general peritoneal soiling may not take place in the event of injury to the tumor, the bladder, or the intestine. Should such injury occur to a viscus it is repaired at once if the damage implicates the muscular coat. At the close of an operation in which the separation of dense adhesions has been a feature, the intestine to which the tumor was

adherent should be carefully inspected, and areas deprived of peritoneum be repaired by one or two sutures taken in Lembert fashion. Minute unprotected intestinal injuries unquestionably are a common cause of death following the removal of densely adherent tumors. Once the tumor has been liberated,

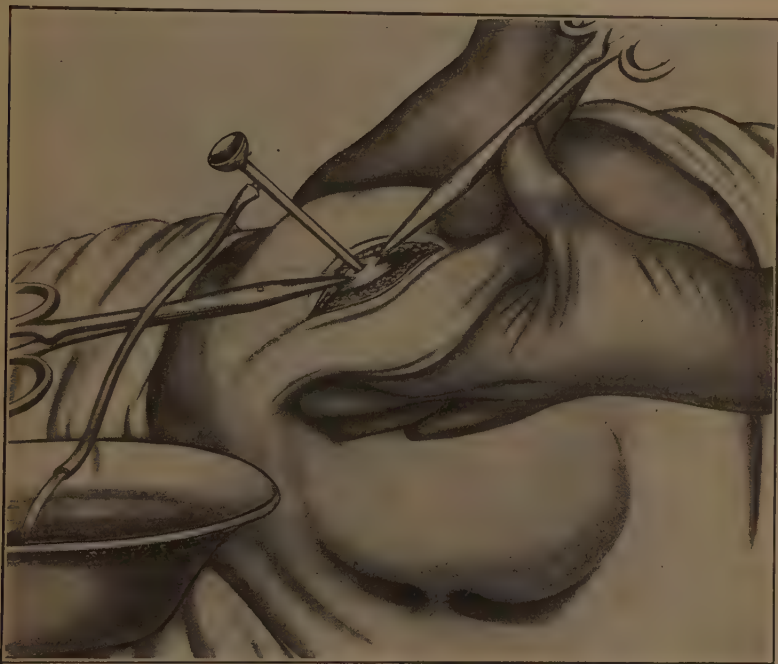


FIG. 221.—Ovariotomy. Very large ovarian cysts must first be reduced in size by tapping.

the operation proceeds as previously described for non-adherent growths.

While the immense tumors of olden days are rare at the present time, an occasional cyst is encountered of such size that to remove it intact would require so long an incision as to seriously damage the integrity of the abdominal wall. In addition to this the frequent presence of adhesions renders the technique considerably more difficult unless the growth is

reduced in size, so that cysts exceeding the size of a seven months' pregnant uterus are removed in the following manner. Only a short incision is made, and after the anterior surface of the tumor is exposed the abdominal wall is held firmly against it by the hands of an assistant making pressure on the outside.



FIG. 222.—Parovarian cystectomy. Incision through clear space in broad ligament. Serosa separated from tumor wall by blunt dissection.

An ovarian trocar is then thrust into the tumor, and as the fluid escapes and the tumor becomes flaccid it is gradually drawn through the incision. In multilocular cysts it is necessary to perforate the walls of the daughter cysts and evacuate their contents before the tumor can be withdrawn completely. Adhesions to the viscera are stripped off by sponge pressure

as they appear in the incision. At all stages of the operation care should be exercised that the peritoneal cavity is not soiled.

Pedicles of these large tumors are treated precisely like those of the smaller ones. Occasionally it will be found that one of these growths has developed a band of dense adhesions to the bowel, the omentum, or the stomach, in which the vessels have attained such extraordinary size that it may be regarded as a second pedicle. This should be ligated as carefully as the true pedicle. Occasionally also, some portion of the intestine is so densely adherent, or so surrounded by the growth, that the removal of the latter is impossible without the infliction of great damage upon the intestine, under which circumstances resection may be necessary. The operator who essays to remove a large adherent tumor must be prepared to cope with any intestinal operation which the exigencies of the case may demand.

Parovarian Cystectomy.—The removal of a parovarian cyst demands a technique of its own as the tumor has no pedicle, is sessile, and its blood supply comes through a broad base in close proximity to the ureter.

The tumor first is thoroughly exposed and an area free from vessels sought on its broad ligament surface. Through this clear space an incision is made parallel to the tube, the incision penetrating the serosa only. Through this opening a finger is inserted and the tumor wall, anteriorly and posteriorly separated from its broad ligament covering by blunt dissection. No attempt should be made to approach the base of the tumor until the latter has been sufficiently freed to permit dissection under guidance of the sight. Bleeding points are caught with forceps as they are developed, but clamping of the tissue in large masses is dangerous unless the ureter is in plain view. The entire growth having been freed excepting at its base, the tumor is rolled from its bed, and as the main vessels are exposed they are caught and cut individually.

The tumor having been removed, the vessels are ligated with

plain catgut and the margins of the peritoneal opening are approximated by a running suture.

In some cases it will be found judicious to ligate the ovarian vessels both in the infundibulo-pelvic ligament and at the uterine horn, but if this is done the ovary should be removed at the same time in order to prevent its subsequent degeneration.

At other times the blood supply is so free that even more certain preliminary hæmostasis is demanded. This can be secured through removal of the uterus by the technique recommended for fibroids which expand one broad ligament. The ovarian and uterine vessels, on the side *opposite* the tumor, are clamped and cut, the body of the uterus severed from the cervix, and the uterus drawn to the diseased side until the uterine artery on that side is secured. After this is caught and cut, the uterus and tumor are rolled out still farther toward the diseased side, in this way exposing the blood supply to the under-surface of the tumor each vessel to which is secured as it is demonstrated, while the ureter and parametrium are brushed away without injury.

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CHAPTER XIV

PELVIC PERITONITIS, PELVIC CELLULITIS

Peritonitis.—Acute peritonitis may be classified as local, diffuse, and general.

The term local peritonitis implies that the inflammatory process is confined to one of the anatomical subdivisions or regions of the abdominal cavity.

By diffuse peritonitis is meant a spreading inflammation which overruns the boundaries of the anatomical region first involved, perhaps extending over a considerable portion of the peritoneum lining the abdominal cavity. Diffuse peritonitis often is improperly called general peritonitis, the latter term, when correctly used, meaning a universal inflammation of the entire peritoneal surface.

Peritonitis is sometimes defined according to its microbic origin, as gonococcus peritonitis, staphylococcus peritonitis, streptococcus peritonitis, colon bacillus peritonitis, or pneumococcus peritonitis. Occasionally one sees the term peritonitis modified by the name of the organ in which the infection originated, as appendicular peritonitis or gall-bladder peritonitis.

Peritonitis which involves the pelvic peritoneum only differs in some respects from that affecting other portions of the abdominal cavity, but on the whole the inflammatory process is the same wherever it occurs.

Pelvic peritonitis is so frequently due to gonococcus infection that it is more likely to remain localized than is peritonitis in other regions as, for example, the epigastric. On the other hand infectious material gravitates to the lowest portion of the abdominal cavity and along the mesenteric planes, and the pelvis therefore may be involved in a peritonitis which origi-

nated elsewhere, as from a perforated stomach, gall-bladder, or appendix.

The pelvic peritoneum absorbs less rapidly than the peritoneum which lines the upper portion of the abdominal cavity, especially the lower surface of the diaphragm, and a larger area of pelvic peritoneum may be infected with less serious consequences than a smaller area elsewhere. It is stated that peritonitis as an inflammatory process is of no moment the infection being the only matter worth considering, but this is not strictly true since inflammation of the peritoneum is very painful, absorption of toxic products from the peritoneal cavity is rapid, and secondary intestinal paresis with resulting stasis adds to the pre-existing microbic toxæmia.

Etiology.—Inflammation of the peritoneum is caused by trauma, by chemical irritation, and by microbic infection.

Peritonitis from trauma is purely protective in character and gives rise to no marked symptoms, but it may result in adhesions.

Peritonitis from chemical irritation is local in its character, and while it may be severe it is not dangerous unless infection is added. Infection is more likely to take place if either traumatic or chemical irritation has lowered the resisting power of the peritoneum; otherwise neither traumatic nor chemical peritonitis are of any importance excepting for the adhesions which they produce.

Gonococcus peritonitis excepted, pelvic peritonitis has a microbic origin, the staphylococcus, streptococcus, and colon bacillus being the organisms most frequently found. It is doubtful whether peritonitis arising from gonorrheal infection really is microbic, and it is considered more likely that the irritating qualities of the extravasated gonorrheal pus are responsible for the inflammatory process, rather than that the gonococci grow and multiply on the peritoneum.

Clinically, pelvic peritonitis is the direct result of gonorrheal salpingitis, of infection of the cervix and uterus, of perforation of the uterus, of rupture of ovarian abscesses or infection of

hæmatomata, and it may arise from perforated viscera anywhere in the abdominal cavity. The method of infection from salpingitis and rupture of ovarian abscess is clear. In uterine and cervical infections it may arise through direct continuity of tissue, no matter how the original infection was produced. Uterine perforation only results in peritonitis when the perforating instrument is dirty or inflicts damage on the intestine or bladder.

A perforated appendix may be situated in the pelvis, or the products of inflammation may gravitate over the brim into the pelvic cavity.

A perforated infected gall-bladder may discharge sufficient infectious material to reach the pelvic peritoneum, and gastric contents are quite constantly found in the left side of the pelvic cavity after perforation of ulcers of the stomach and duodenum. It may be said with truth that the pelvic cavity is the pathological cess-pool of the abdomen.

Gross Pathology.—The pathological conditions found as the result of pelvic peritonitis are dependent on the kind of micro-organisms present, their number, their virulence, and the resistance which Nature has succeeded in providing.

In the most virulent cases the peritoneum has a scalded shiny appearance; and there is little or no exudate of any kind. In cases due to trauma or chemical irritation as well as those due to very mild infection, the peritoneum is reddened, and in the pelvic cavity there is a moderate quantity of exudate which at first is serous in character, but which soon solidifies and binds together the organs whose peritoneal coats have been involved. This serum is sometimes clear, sometimes cloudy, but if the infecting agent is at all virulent it rapidly becomes purulent.

Occasionally one sees large masses of white fibrinous exudate occurring in patches or plaques which are friable and easily broken away from the underlying viscera, leaving a raw bleeding surface beneath their site of attachment. The intestine whose peritoneum is involved is always paretic, possibly from

infiltration of its muscular structure, possibly from the influence of absorbed toxic products on its nervous mechanism.

Symptoms and Diagnosis.—The symptoms of pelvic peritonitis vary widely according to the virulence of the infection and the manner in which the infecting agent has gained access to the peritoneal cavity.

In the most virulent type, due to intestinal perforation for example, the shock of perforation may be succeeded by a virulent, rapidly fatal, general peritonitis, with no symptoms save pain and vomiting. One may assume that in such a case the virulence and number of the infecting organisms is so great that death occurs before Nature's protective mechanism can provide any resistance, and that on this account there is an absence of the usual symptoms.

Ordinarily the first symptom of peritonitis is pain, and this is of two types, the characteristic lancinating pain which apparently is independent of any intestinal movement, and the colicky irregular pain produced by intestinal peristalsis. The pain of peritonitis is severe, and its greatest intensity is in and about the region involved. While visceral colic, like appendicular colic, may be referred to the epigastrium, peritonitis about an inflamed appendix leads to characteristic pain in the right iliac fossa.

Shortly after the onset of pain vomiting is likely to take place, and it may remain a striking feature throughout the course of the disease, the vomited material consisting of stomach contents and bile. Usually marked constipation is present, but occasionally the bowels are loose and the passages foetid. The pulse is always more rapid than normal and in any but the most severe cases the temperature is elevated, but the degree of fever is no indication of the severity of the infection, both the rate and character of the pulse being a far better guide than the temperature.

Inspection of the abdomen shows, first and most prominently, a restriction in the respiratory excursions of the abdominal wall,

an extremely severe case of diffuse or general peritonitis revealing a perfectly immobile abdomen.

Auscultation of the abdomen in the latter form may show a total absence of peristalsis, the respiratory and cardiac sounds being heard with startling distinctness. In peritonitis limited to the pelvis the upper abdomen moves with respiration and the usual peristaltic gurgling is heard with the stethoscope, the louder sounds often coinciding with attacks of colicky pain. Very light pressure upon the abdominal wall elicits superficial hyperæsthesia over the inflamed area as it is supplied from the same spinal cord segments as the skin overlying it. Deeper pressure brings out the protective rigidity of the abdominal muscles which is almost always present in peritonitis, although it is more distinct when this affection is above the pelvic brim. Some tympany is present in every case unless it be of the virulent type which reaches a fatal termination within a few hours. Examination of the blood shows a polymorphonuclear leucocytosis, the degree of leucocytosis corresponding somewhat to the severity of the infection but being far from an infallible guide.

On making a vaginal examination, if the peritonitis is pelvic the atrium of infection may be discovered in a gonorrhœal discharge, or evidence of a recent abortion or delivery. If the inflammation is limited to one side motion conveyed to the uterus causes pain on that side, and there is marked tenderness to pressure. As the disease progresses and the fibrin content of the peritoneal serum solidifies, a noticeable swelling makes its appearance above the vaginal vault, and the general symptoms may abate at this time owing to localization of the infection and diminution in the rapidity of absorption of toxic products from the infected area. Should suppuration not supervene the temperature and pulse fall, the pain lessens, the appetite returns, the bowels respond more readily to enemata, and the facial expression notably improves. Should the pulse and temperature continue elevated over many days

with more or less constant pain and tenderness, it is fair to assume that suppuration is taking place somewhere in the mass of exudate which fills the pelvic cavity, providing of course the original infection is not responsible for continuation of the symptoms. Gonorrheal pyosalpinx may cause protraction of the symptoms for many weeks without suppuration outside the tube. On the other hand, both pulse and temperature may approximate normal while a large pelvic abscess is forming if the latter is well walled in, but the patient continues to suffer pain, and the expression of the face indicates serious illness.

When suppuration occurs in the pelvic cavity the abscess usually points in the direction of the vaginal vault and causes an increasing swelling at that point whose growth can be observed from day to day, and sooner or later an area of softening can be detected by the examining finger. Rarely the onset of suppuration is signalized by a chill, but no dependence whatever can be placed upon the absence of this symptom.

In some cases the abscess points toward the rectum, when there will be more or less rectal tenesmus and discharge of mucus. On examination through the anus the sphincter will be found relaxed with a bulging swelling above it which is palpable to the examining finger.

These symptoms are so pathognomonic of an abscess pointing toward the bowel, that rectal tenesmus with the passage of mucus during an attack of pelvic peritonitis, should always lead to examination by this route.

The diagnosis of pelvic peritonitis is usually made by a consideration of the symptoms and physical findings above presented, but a mistake as between pelvic peritonitis, intestinal obstruction, and ruptured extra-uterine pregnancy is fairly frequent.

In peritonitis limited to the pelvis, the vomiting is never fecal in odor and constipation is not absolute. There is sharp lancinating pain as well as that which is colicky, peristalsis is never violent as in obstruction, and visible intestinal coils are

not observed in peritonitis, the distension being uniform and smooth. The pulse may be bad in obstruction, but the temperature is not disturbed and neither flatus nor fecal matter are expelled. In extra-uterine pregnancy after the period of rupture, the symptoms may closely mimic those of low-grade peritonitis, indeed traumatic peritonitis is present about the effused blood, but the extreme anæmia is not a factor in peritonitis as it is in ruptured tubal pregnancy. An accurate history of preceding cystitis and vaginitis, attempted abortion, or instrumental interference with the uterus, leads to a strong presumption of peritonitis as soon as abdominal symptoms occur, but it should not be forgotten that criminal abortion has more than once been attempted in cases in which the pregnancy really was tubal.

To diagnose the type of peritonitis correctly and thus be able to make an accurate prognosis and institute proper treatment is more difficult than to establish the fact that peritonitis exists.

Prognosis.—A history of gonorrhea or the presence of gonococci in the urethral or cervical discharge, leads to the presumption that a leaking tube is the cause of the peritoneal inflammation, but the possibility that a patient has acquired gonorrhea after becoming pregnant, or that appendicitis has supervened in a patient who already has gonorrhea, must be taken into account. Exclusion of other possible causes of peritonitis and positive findings regarding gonorrhea, gives an entirely hopeful view to the prognosis so far as life is concerned. The course of gonorrheal peritonitis may be long drawn out, but recovery from the acute infection is almost certain regardless of its apparent severity. Even the most virulent types of peritonitis will recover if the infection remains localized in the pelvis, the grave prognosis of peritonitis after labor being due to its rapid spread throughout the entire abdominal cavity. Peritonitis following an infected abortion often extends to the general peritoneum if the infection is streptococcic. Staphylococcus

infection is usually less serious, and that from the staphylococcus albus is quite certain to remain localized.

A knowledge of the source from which the infection arose and the character of the invading micro-organisms is thus helpful in formulating a correct prognosis. Diffuse peritonitis which is spreading from the pelvis upward may often be checked by proper treatment, but true general peritonitis is almost uniformly fatal. The outlook is very bad indeed if with abdominal evidences of severe peritonitis the pulse is thready and running, the extremities cool and cyanosed, vomiting is without effort, and the vomited material is thin and black.

The facial expression also is indicative of the condition of the patient. The face may express apprehension, severe pain, etc., in a hopeful case, but in fatal cases of general peritonitis the whole aspect is that of a patient already moribund.

Treatment.—The treatment of pelvic peritonitis by the surgical removal of its cause would seem to be the logical method of procedure, but the hazards associated with such radical operations when infected tubes and ovaries are responsible have been sufficiently dwelt upon. If the cause is a perforated or inflamed viscus or an inflamed appendix the risk of operation is less than the risk of a waiting policy, providing operation is not delayed until the stage of vaso-motor paresis, cyanosis of the extremities, etc.

In a general way, peritonitis of gonorrheal origin demands palliative and symptomatic treatment only. Peritonitis arising from ovarian infection or from the infection of a *small* uterus demands early drainage through the posterior vaginal fornix. Peritonitis from a perforated viscus, whether in the pelvis or above it, demands early abdominal section with removal or repair of the perforated organ.

The medical treatment of pelvic peritonitis is formulated under the treatment of acute salpingitis, as the latter disease is but rarely distinguishable from the peritonitis which it causes. Briefly restated this consists in the avoidance of cathartics, abso-

lute rest in bed, elevation of the head of the bed, the use of the ice-bag over the pelvis (or heat if cold is disagreeable), and sedatives in sufficient doses to allay pain, together with a restricted diet and simple enemas. Should the affection tend to assume the diffuse form, as shown by increasing tympany and broadening of the area of hyperæsthesia and rigidity, absolute starvation is indicated for at least 24 hours in order to inhibit peristalsis. If the infection spreads in spite of these measures, drainage through the vagina may be considered. The latter procedure is indicated at an early date in peritonitis from ovarian infection or ruptured ovarian abscess, or infection from uteri which are not so large as to be abdominal rather than pelvic organs. Meantime all the medical measures indicated should be continued, as drainage is only one factor in the treatment, but its prompt use may throttle in its incipency what might otherwise prove to be a serious infection.

An inflamed appendix situated in the pelvis should be treated by early removal precisely as though it were in the right iliac fossa. Overwhelming general peritonitis is so universally fatal, no matter what the treatment, that when it is seen late in its course it should be handled purely symptomatically. Earlier, a simple drainage operation under local anæsthesia is of some value, and if the inflammatory process is in the diffuse stage, not having reached its acme, such an operation may be curative.

Chronic Pelvic Peritonitis.—The great majority of cases which are diagnosed as chronic peritonitis are those having “left-over” products from the acute form. An occasional patient is met with who has an apparent predilection toward the formation of adhesions, and there is a special type of sclerosing peritonitis the etiology of which is wholly unknown. In this the primary process seems to be in the mesentery, cicatrices gradually extending to the free border of the intestine and binding all into one solid mass which is pierced in a tortuous manner by the intestinal lumen. Such cases are not often correctly diagnosed and are more likely to be discovered accidentally during

the course of an operation for some other disease. Careful separation of all adhesions seems to be the logical treatment with the hope that if they re-form they will be less troublesome than in their original location.

Acute Pelvic Cellulitis.—All chronic pelvic inflammations were regarded as cases of pelvic cellulitis until Lawson Tait began his career as an abdominal surgeon and proved that what had been so regarded and treated really was salpingitis. Following this demonstration it became fashionable to look upon all pelvic inflammation as intra-peritoneal. This position is wholly untenable, as both acute and chronic inflammation of the pelvic cellular tissue are of frequent occurrence.

Acute pelvic cellulitis almost without exception is due to an infected injury of the cervix or body of the uterus. Instrumental dilatation of the cervix to provide room for the removal of retained infected products of conception often results in acute pelvic cellulitis, as does dilatation with intent to induce abortion. Infection of the cervix after a full-term labor may also result in acute cellulitis. For some reason which is not clearly understood, the onset of cellulitis follows at a comparatively late period after the presumed infection has taken place.

Symptoms, Diagnosis and Clinical Course.—In a patient whose preceding history indicates that infection of the cervix or uterus is possible, elevation of temperature, rapid pulse, continuous moderate pain, and vesical or rectal tenesmus should lead to a suspicion of pelvic cellulitis. Upon examining a patient with acute cellulitis a swelling will be found at one or both sides of the uterus, this swelling tending to encircle the cervix like a collar. At the sides of the uterus the swollen tissue depresses the lateral fornices of the vagina and seems much closer to the examining finger than it does in salpingitis or ovarian abscess. This swelling extends solidly to the pelvic wall and ultimately may run far up over the pelvic brim, passing outward between the layers of the broad ligament and elevating

the parietal peritoneum external to its reflexion onto the pelvic wall.

The characteristic features are the moderate pain (much less than in peritonitis), the close proximity of the inflammatory mass to the examining finger, and its extension between the bladder and cervix anteriorly exactly as one would expect if the anatomical distribution of the cellular tissue in the pelvis were kept in mind. This inflammatory exudate may undergo resolution, it may be riddled by the formation of multiple small abscesses, or one large abscess may develop which points into the vagina, the bladder, the rectum, or through the anterior abdominal wall just above the inguinal ligament. Extension of

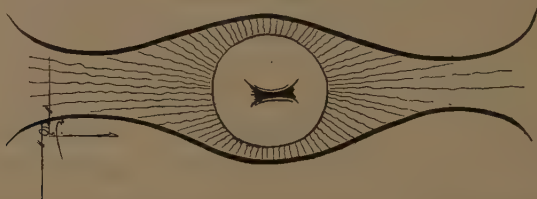


FIG. 223.—Location of exudate in pelvic cellulitis. (*Redrawn from Montgomery.*)

infection by way of the hilum of the ovary may result in secondary ovarian abscess and peritonitis.

Even in those cases in which resolution finally occurs, the process extends over a protracted period with alternating remission and exacerbation of symptoms, and with the formation of multiple small abscesses a most annoying and long-drawn-out course is certain to ensue. The diagnosis of suppuration is frequently impossible, or if it is suspected the location of the pus is uncertain until spontaneous opening into the bladder or rectum has occurred, when a definite cystitis or proctitis may be added to the original trouble. Patients with rather acute symptoms are more likely to develop free suppuration, the evacuation of the abscess resulting in early cure.

Treatment.—Were the anatomy of the broad-ligament bases less complicated, early incision and drainage through the vagina

would be an ideal mode of treatment, as is early free drainage in infection of cellular tissue elsewhere. Unfortunately, the risk of opening the bladder or ureter, or of damaging the uterine artery in an inaccessible location, is too great to justify operation until pus formation with softening is fairly evident. The treatment at an early stage, therefore, is purely palliative, and rest in bed until all the symptoms have subsided is imperative. Many patients subject themselves to unnecessary risk and prolong their suffering many weeks by getting about while a *little* elevation of temperature persists. In a mild case the pain is so trivial that it is difficult to persuade a patient of the necessity for complete rest, but treatment is futile without it. Cathartics are harmless as the infection is extra-peritoneal, and very long hot douches are comforting. Whether they are of any definite value is open to question but the probability of benefit is much greater than it is in intra-peritoneal inflammation. Persistence of symptoms over many weeks gives rise to a suspicion of pus formation, and repeated examinations should be made to ascertain whether any point of softening is present. Localized extreme tenderness to pressure, or oedema over a local area, is sufficient to justify an exploratory incision. If softening occurs in the vaginal vault at one side of the cervix, a small incision should be made at this point and a sharp-nosed hæmostat be used to tear the opening wider if pus is found. Visible swelling above the inguinal ligament usually means that an abscess has formed which should be opened through the abdominal wall without invasion of the peritoneal cavity. This is accomplished by using only blunt dissection after the peritoneum is reached, and stripping it back from the pelvic wall until the inflammatory focus is entered.

Chronic Pelvic Cellulitis.—Doubt is sometimes expressed that chronic cellulitis exists, but this doubt may be dissipated by investigating the condition of the broad-ligament bases in cancer of the cervix, cellulitis with fixation being an accompaniment of cervical carcinoma before malignant invasion has occurred.

Contraction of the cicatricial tissue in one broad ligament, which draws the uterus toward that side of the pelvic cavity, practically always follows an acute cellulitis.

There is a distinct chronic cellulitis which accompanies old infected cervical lacerations, and its results may be palpated as a cicatrix running off from the apex of the tear. Patients having this form of chronic cellulitis complain frequently of pelvic pain, and are as frequently thought to have "ovarian disease" because of the location of the pain and tenderness.

The treatment is simple and consists of amputation of the cervix to the infection of which the cellulitis is secondary. Hot douches and tampons alleviate the discomfort, the latter acting by maintaining the uterus in such position that it does not drag on its broad-ligament attachments.

POSTERIOR VAGINAL SECTION

The indications for vaginal section, for exploration and for drainage, have been given in the sections devoted to ovarian inflammation, peritonitis, and ectopic pregnancy. When mentioned in these connections incision through the posterior vaginal wall is referred to, but it is quite possible to open and explore the pelvis through an opening anterior to the cervix, that is between it and the bladder, although this presents no special advantage and is more difficult.

One of the advantages of posterior vaginal section lies in the fact that it can be done under local anæsthesia if the patient is in such condition that a general anæsthetic would add materially to the risks, the principal discomfort of the patient who is not anæsthetized being due to such traction upon the perineum as is necessary in order to expose the vaginal fornix.

The patient is placed in the lithotomy position and the same aseptic precautions taken as would be the case if the abdomen were to be opened through its anterior wall. The perineum is well retracted and the vaginal wall behind the

cervix picked up with tenaculum forceps or a long hæmostat. The cervix itself is not drawn upon, as no more certain method could be adopted for tearing adhesions and flooding the pelvis with pus.

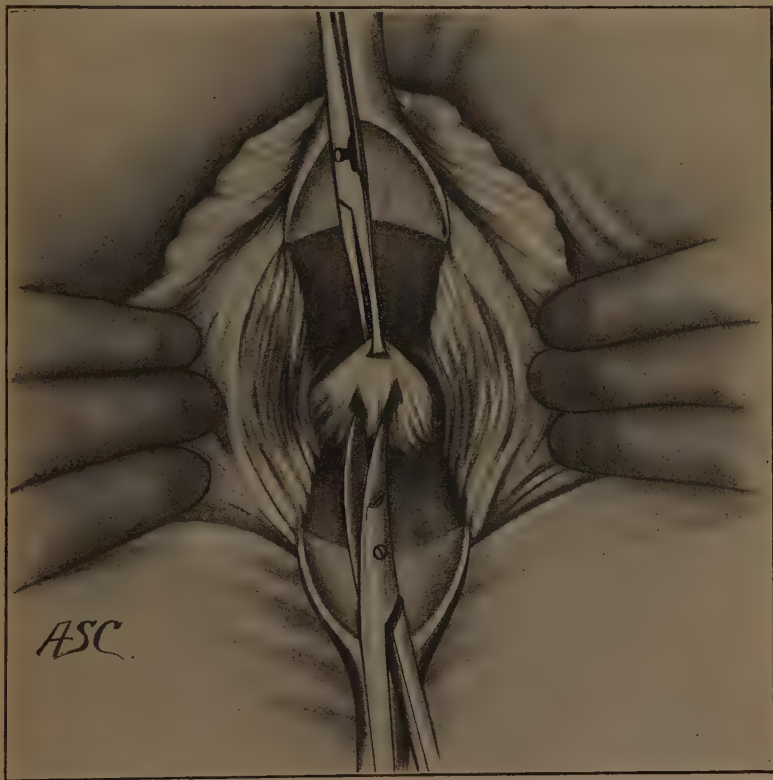


FIG. 224.—Posterior vaginal section. The vaginal wall posterior to the cervix is picked up and incised transversely.

The fold of vaginal wall in the hæmostat is drawn down and a transverse incision made squarely across this fold with scissors. This incision should be from 3 to 5 cm. long. The connective tissue between the vaginal wall and peritoneum is pushed aside with the fingers or closed scissors until the peri-

toneum is exposed, the points of the scissors or end of the finger being directed upward and toward the cervix in order to avoid injury to the rectum. One or two vessels in the vaginal wall may spurt vigorously and should be controlled with forceps. The incision is now opened widely by drawing on its anterior and

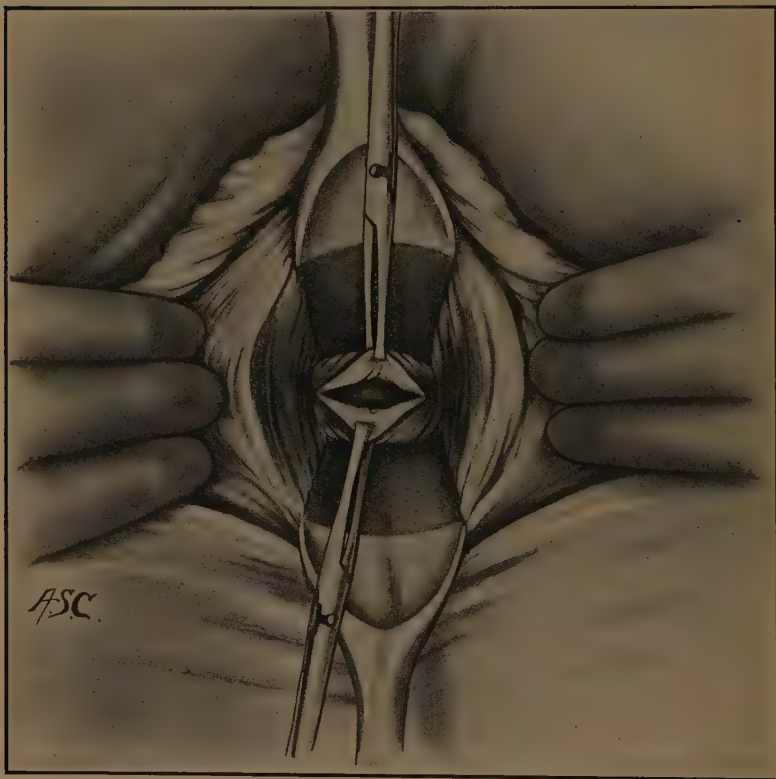


FIG. 225.—Posterior vaginal section. The peritoneum is exposed and may be picked up and incised as in laparotomy through the anterior abdominal wall.

posterior folds, and if the operation is a formal one the peritoneum is picked up and incised. If the opening is only for drainage, or to withdraw the vaginal end of a gauze pack, the peritoneum is torn through with a blunt instrument.

Should pus or blood be present it will escape at once, and the disposition to cease work is strong. In most cases, however, in which vaginal section is indicated further exploration with the finger is necessary. If the operation is purely exploratory and diagnostic, as in ruptured extra-uterine pregnancy, the

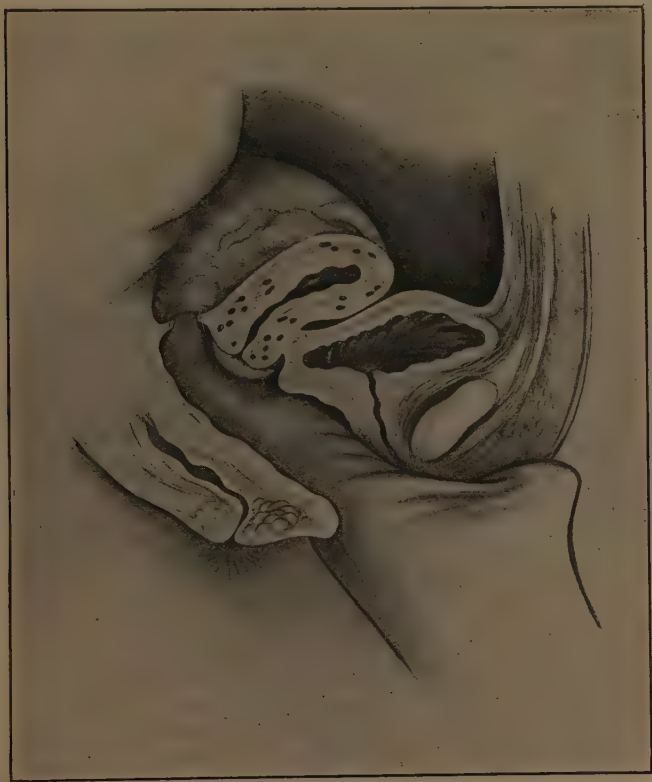


FIG. 226.—Posterior vaginal section. The finger introduced for exploration

average operator will do well to insert two or three stitches in the vaginal incision and proceed to open the abdomen from above, while the expert will possibly be able to remove the tube through the vagina. If the incision opens a well-walled-off hæmatocele, the insertion of a drain is all that is required.

In pus cases all instruments are withdrawn from the vagina excepting those which hold the incision open, and the finger is introduced to note the condition of such pelvic structures as can be palpated. A gonorrheal pus tube should not be broken



FIG. 227.—Posterior vaginal section. The operation completed. Gauze drain protruding.

into through the vaginal incision, since its evacuation opens a cavity which was on its way to spontaneous sterilization and opening it is likely to lead to a tubo-vaginal fistula. Many failures to permanently cure pelvic infection are due to neglect

in not palpating the organ originally involved, and determining whether salpingitis, or acute oophoritis, is responsible for the suppuration. In the former, simple drainage of the pelvic cavity is all that is needed; in the latter, not only must the pelvic cavity be drained but the ovary itself should be perforated with the finger or a blunt instrument.

Drainage can be secured by any method which will keep the lips of the incision apart without at the same time plugging the opening. In hæmatocele, and in early infection in which serum is present, a fluffy gauze drain is sufficient. In pus cases drainage is best accomplished by a large tube which is introduced but a short distance into the abscess, as a long tube may rupture adhesions and open the general peritoneal cavity. Difficulty is always experienced in keeping the tube in place unless it is made with a T at the end, but a stitch of non-absorbable material passed through the tube and one lip of the incision is equally efficient if a T tube is not available. The tube should extend to the vulva which should be covered by a large laparotomy pad. In the after-treatment these pads should be changed as often as the necessities of the case demand, and the patient should not be catheterized unless absolutely necessary on account of the risk of infecting the bladder.

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CHAPTER XV

CONGENITAL ANOMALIES

A brief consideration of the embryological development of the female genitalia and adjacent parts will convince one that nearly all, if not all the anomalies, are due to arrested development.

The development of the ovaries from the genital glands of early embryonic life; of the tubes, uterus, and vagina, by fusion of the Müllerian tubes; of the vulva from the genital tubercle; and the bladder and urethra from the allantois; as well as the early embryonic existence of a cloaca into which the bladder, vagina, and rectum open; serves to explain the etiology of congenital anomalies by an arrest of development before the complete evolution of the adult parts.

Conditions which are extremely rare, and minute distinctions between types of the same general deformities, will not be touched upon as they are of academic interest only.

THE VULVA

Hermaphroditism.—The most striking developmental defect about the vulva is that associated with hermaphroditism. True hermaphroditism, that is the association of both male and female true sex organs in the same individual, probably does not occur. Pseudo-hermaphroditism, in which the external organs apparently belong to one sex while the true sex organs are those of the other, is fairly common. In most instances these individuals really are males whose external organs closely resemble those of the female while the testicles are either in the inguinal canal or abdomen. Some males, who really are

only hypospadiacs or cryptorchids, are regarded as females until they reach the age of puberty, when they reveal such conclusive male secondary sexual characteristics as to lead to a thorough examination.

A description of the most striking case seen by the author will serve as an example to illustrate male pseudo-hermaphroditism.



FIG. 228.—Author's case of a male pseudo-hermaphrodite.

This individual always had been regarded as a girl and at the age of seventeen was in the senior class in high school. She had known of a small inguinal hernia for some time, and on returning from school one day the hernia came down, severe pain occurred, and her physician was unable to reduce it under anæsthesia. The patient was brought to the hospital, where an examination confirmed the previous diagnosis of strangulated hernia. Out of respect for the age and presumed sex of the patient, the external

genitals were kept covered during the examination as well as the preparation for operation.

Under anæsthesia the usual incision for inguinal hernia was made, and considerable free fluid was found in the sac together with a loop of discolored small intestine, whose vitality was not seriously impaired. On reducing the intestine an ovoid body resembling an ovary was found in the posterior portion of the sac. This was much discolored, apparently gangrenous, and also seemed densely adherent to that portion of the sac to be removed, so that no hesitation was felt in removing it with the sac. The patient was in rather serious condition, regurgitating intestinal contents at intervals and taking the anæsthetic badly, but something about the appearance of this organ led to the introduction of the fingers into the pelvic cavity in an effort to find either the tube or uterus, both of which were absent. The other inguinal canal contained a palpable organ about the size of the one just removed. Examination of the external genitalia then showed a hypospadiac penis 3 cm. in length, with the urethra at its base, and a cleft scrotum with a depression in the mid-line, 1 cm. in depth, which might easily be mistaken for the vaginal orifice. The scrotal hair was thick and coarse, and neither half of the scrotum was larger than a well-developed labium majus.

The secondary sexual characteristics were masculine. The breasts were flat, the arms flat and muscular, and the buttocks thin. The voice alternated between the high pitched voice of a child and the low pitch of an adult male, and in fact was just "changing."

Females with hypertrophy of the clitoris and stenosis or atresia of the vagina or vulva are sometimes thought to be female hermaphrodites, but such trifling deviations from the normal do not deserve to be so classified.

The most imperative consideration in pseudo-hermaphroditism is to determine the sex of the individual at an early age, the danger of allowing a male hermaphrodite of the type above

described to mingle with girls of his own age being so apparent as scarcely to need mentioning. With a testicle in the inguinal canal the task is easy; if both are retained in the abdomen it may be difficult, but the obviously safe course is to dress such individuals as males until the contrary can be proven.

Persistence of the embryonic cloaca through failure of development of the recto-vaginal septum is also occasionally observed. In one such instance seen by the author, the rectum opened by a large orifice just within the vulvar cleft, but the urethra had continued on to perfect development. The menstrual molimen occurred, but without menstrual flow, each period being punctuated by four or five days of severe bronchial asthma. Aside from the genital organs this patient was a perfectly developed female, and bimanual rectal examination revealed the presence of both ovaries but complete absence of the uterus and upper portion of the vagina.

Anomalies of the Hymen.—Anatomically, the hymen is described as a crescentic membrane guarding the vaginal introitus. Embryologically, that view which regards the hymen as the analogue of a portion of the male corpus spongiosum seems to be borne out by the continuation of the outer edges of the hymen upward to the urethra in the foetus and in some young infants. The very severe hemorrhage which occasionally takes place when the hymen is ruptured could thus be explained by the presence of erectile tissue in its structure.

A variety of shapes and forms are met with, but none are of importance excepting complete closure of the membrane, imperforate hymen. This anomaly is not likely to be discovered until after puberty, when the symptoms of menstruation without external discharge lead sooner or later to an examination, possibly not until several years have elapsed and the patient's abdomen has become noticeably enlarged. Usually there is enough pain to lead to an examination before extreme distension of the genital canal has taken place, but the ignorance of young girls concerning the onset of menstruation and the degree

of discomfort which they should suffer at this time is astounding. The diagnosis is readily made. On separating the labia the hymen is found bulging from the pressure within, and the dark color of the retained menstrual fluid is seen through the thinned out membrane. If the condition has existed for many months, the vagina, uterus, and tubes are distended with the retained

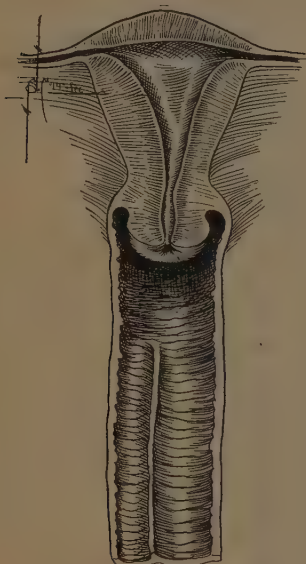


FIG. 229.—Double vagina, the longitudinal septum ending before reaching the cervix.

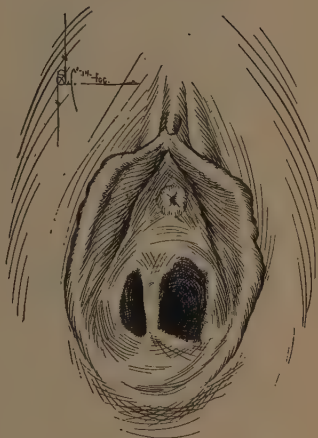


FIG. 230.—Double vagina. Septum as it appears on inspection of the vulva.

secretions, the uterus and vagina forming one canal as they do during the second stage of labor. The distended tubes may or may not communicate with the uterus. In the latter event the tubal secretion distends them unaided by reflux from the uterus.

THE VAGINA

The congenital vaginal defect most frequently encountered is a transverse band which produces stenosis and occasionally

complete atresia. The occluded membrane generally has a small opening at some point so that menstrual fluid is not retained, and pregnancy is possible if this band is sufficiently high in the vagina to permit coitus.

Occasionally, owing to complete failure of development, no vagina at all can be found. The vulva may present a normal appearance, but the anterior rectal and posterior bladder walls are completely fused.

The double vagina also is not so very rare. In these patients absorption of the wall between the lower ends of the Müllerian tubes has not taken place. The uterus, cervix, and vagina may be double, or the septum may end before reaching the cervix, the internal genitalia being normal.

One Müllerian tube may be more completely developed at its lower extremity than the other, so that one vagina may be normal while the other is small and imperfectly developed, and in such a case repeated examinations may have been made without detecting the abnormality. If the septum between the two halves of the vagina is incomplete, it is of little moment aside from the certainty of its injury during labor. A complete septum is of more interest, as it frequently points to abnormalities of the cervix and uterus.

THE UTERUS AND TUBES

Fusion of the Müllerian tubes to form the uterus may completely fail, when two uteri are found. More frequently, two bodies and fundi are present, but partial fusion has occurred at the cervix, so that there is presented a single cervix with two canals which branch at the level of the internal orifice, while superior to the cervix are two complete but imperfect bodies. This division may take place at a still higher level, so that but one body is presented which is divided longitudinally by a septum while the fundus is split. The ducts may fuse normally and absorption of the septum fail. In this event the

cervix, body, and fundus form one uterus, but with a complete longitudinal septum. As in the vagina, when the septum is

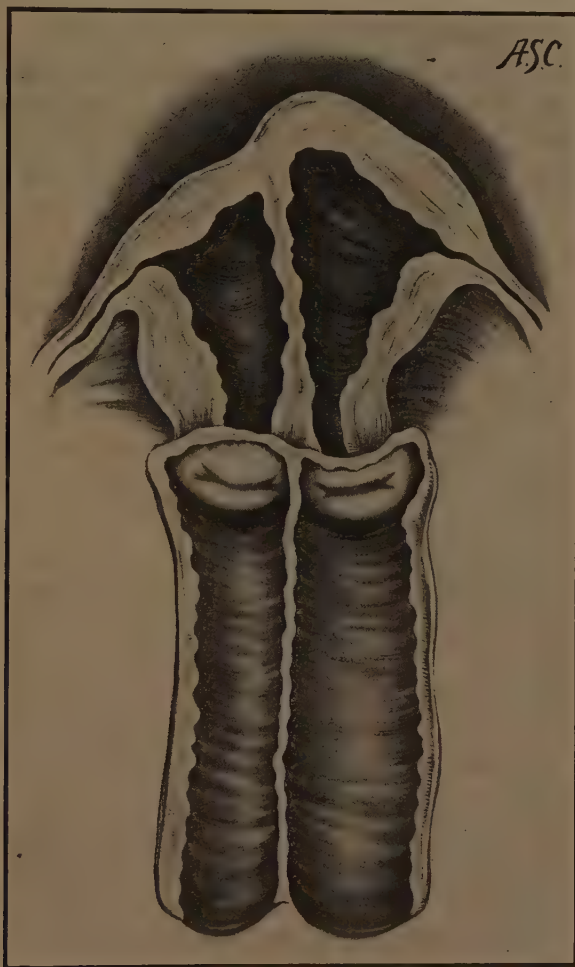


FIG. 231.—The Müllerian tubes have completely failed to fuse. There is a double uterus and vagina.

incomplete the hiatus is at the superior end, so that a septum in the lower half of the vagina may be present, the upper vagina,

cervix, and uterus being normal; or the septum may extend to and through the cervix, the body and fundus being normal; or the vagina, cervix, and body may be divided, the fundal septum being incomplete

Occasionally one Müllerian duct atrophies or entirely fails to develop, when a one-horned uterus with but one uterine tube is found.

Both tubes may be missing—a rare occurrence—or one may be normal and the other absent, as in the unicornate uterus

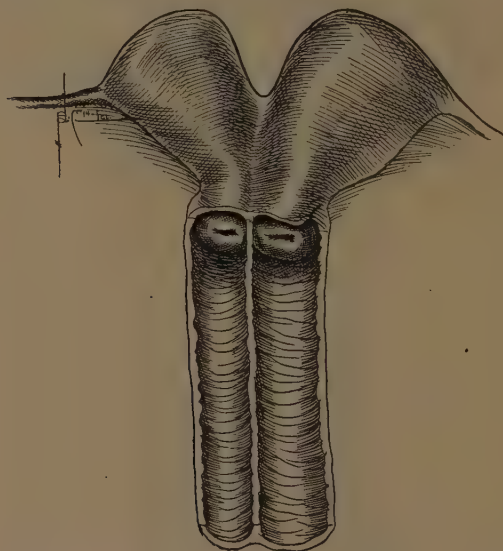


FIG. 232.—Double vagina and cervix. Uterus Bicornis. The Müllerian tubes have not met at the fundus. Split fundus.

mentioned above. One tube may be normal and the other rudimentary, or a tube may present more than one abdominal ostium.

THE OVARIES

The ovaries are developed from the primitive genital ridge and not from the Müllerian tubes. They therefore may

present anomalies when the other genital organs are perfectly normal, or the uterus and vagina may be missing, but the ovaries be both present and functioning. The ovaries may be small, imperfectly developed, or absent when the other organs are present, but under such circumstances complete development does not take place as the ovarian secretion seems to be necessary in order to secure adult development and function. The presence of accessory ovaries often has been assumed in order to explain menstruation and conception after double ovariectomy. The actual occurrence of accessory ovaries is practically unknown however, the continuation of normal function having been due to incomplete removal of one or both organs.

The fundamental relationship which exists between the pituitary body, thyroid, adrenals, and ovaries has not been worked out in its entirety, but that there is some intimate connection between the functions and secretions of these organs cannot be questioned. It is certain that the complete development of some of them is contingent upon the others being present and functioning, and the whole matter is a peculiarly fascinating subject for speculation.

OPERATIONS FOR GENITAL ATRESIA

Imperforate Hymen.—If an imperforate hymen is discovered within a few months after puberty, at a time when nothing but the vagina is distended by the retained secretions, operation for its relief is very simple and consists of a $+$ -shaped incision through the center of the hymen. This should be made under aseptic precautions, and asepsis should be maintained until the complete discharge of that portion of the blood which is adherent to the vaginal walls.

The same operation suffices when the uterus also is distended with dammed up secretions, but the risk of infection is considerable because it is impossible to remove all the adherent blood

and mucus, and decomposition occurs with great facility. Should infection be added to the sapræmia caused by the absorption of the products of decomposition the outcome may be very serious. After incising the hymen, the utero-vaginal canal should be irrigated and gently sponged until it is as free from débris as possible. It is then thoroughly dried and lightly packed with iodoform gauze which should be allowed to remain for several days unless evidence of sapræmia necessitates its earlier removal. When the gauze is withdrawn the utero-vaginal cavity is again irrigated and repacked.

In long-standing cases, in which the tubes also are distended with blood, it is a serious question whether the abdomen should not be opened and the tubes removed. On the whole, however, it seems better to watch such patients carefully after evacuating the contents of the uterus and vagina, but to open the abdomen immediately upon the slightest evidence of peritoneal irritation. By following this plan tubes will not be sacrificed which might recover, and at the same time disastrous infection of the peritoneal cavity can be forestalled.

Transverse bands and septa in the vagina may require cutting in order that coitus may take place. If pregnancy occurs these bands should be removed early in gestation as they may be sufficiently resistant to tear the vaginal wall deeply during labor. Usually such operations are extremely simple and consist of severing the band and ligaturing or suturing any bleeding points. Those diaphragms which are nearly complete are much more difficult to manage as they are sometimes very thick and so draw the lateral vaginal walls, bladder, and rectum toward a common point, that cutting blindly may open the lateral plexus of vaginal veins or one of the viscera.

The patient should be anæsthetized and the dissection made in a slow painstaking manner. Even after a liberal opening is formed, cicatricial contraction may again result in complete occlusion unless the orifice is dilated frequently and over a prolonged period.

Septa running longitudinally do not require surgical interference unless pregnancy occurs. In that event it is safer to split the septum longitudinally than to allow it to remain and undergo injury at the time of labor, with the risk of subsequent sloughing. Complete absence of the vagina is so frequently associated with absence of the uterus that treatment is not often demanded. Occasionally a patient with such a deformity marries, when the exigency of circumstances may render the formation of a vagina necessary. The operation required for this purpose should not be undertaken by one who is not a complete master of surgery, and with all the ingenuity available it is likely to be unsuccessful. Without entering into descriptions which are not suitable for a work of this character, it may be stated briefly that two methods are available after a tunnel has been formed midway between the rectum and bladder. The formation of this canal or tunnel requires a laborious bloody dissection, and must be followed by the adjustment of a suitable lining. For this purpose flaps of skin from the labia and adjacent parts can be utilized, but cicatricial contraction unfortunately sometimes nullifies the entire operation. Transplantation of a loop of small intestine, after the method advised by Baldwin, is more likely to prove a permanent success than the adjustment of skin flaps, but the operation is both difficult and dangerous.

Atresia confined to the lower portion of the cervix is readily overcome by amputation of the cervix and transplantation of vaginal flaps by the Schroeder method.

The double uterus and the uterus with a septum rarely demand treatment, the most important consideration being their recognition.

Pregnancy in the septate uterus seems for some reason to have an unusual fatality attached to it, possibly because injury to the septum so lowers its vitality that sloughing and infection take place.

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CHAPTER XVI

STERILITY. GONORRHEA. THE TREATMENT OF MENSTRUAL DISORDERS

STERILITY

The exact period through which a woman who indulges in regular intercourse must remain unimpregnated before sterility can be assumed is unknown, but for practical purposes two years of married life without pregnancy, unless artificial means for preventing conception have been used, means that the probability of pregnancy is slight.

Etiology.—It is evident that sterility in the female may be dependent upon:

1. Anything which interferes with successful coitus.
2. Anything which prevents the transmission of living spermatozoa from the vagina to the ovule.
3. A defect in the ovule which interferes with its successful union with the spermatozoid.
4. Some condition which will not allow the impregnated ovule to be transmitted to the uterus or,
5. Some condition which prevents implantation and retention of the fecundated ovule in the uterus.

Successful coitus may be prevented by imperforate hymen, stenosis of the vulva or vagina, or vaginismus. In the absence of complete atresia spermatozoa deposited upon the vulva can make their way into the vagina and thence into the uterus, but the probability of pregnancy is enormously lessened if they are not deposited directly in the posterior vaginal fornix. Spermatozoa penetrate the uterus by means of their own automatic form of locomotion, and their presence alive and active in the

internal genitalia has been demonstrated for days after coitus. A diseased condition of the vagina, cervix, uterus, or tubes, which destroys the life or inhibits the mobility of the spermatozoa will prevent impregnation, as will any mechanical impediment to their transmission to the outer end of the tube.

Acids in very weak dilution are destructive to spermatozooids and it is likely that many other toxic substances, even in minute quantities, act in a similar manner so that hyperacidity of the vaginal secretions, vaginitis with pus formation, endocervicitis, endometritis, and salpingitis, may by their toxic discharges cause the death of the sperm cell and thus prevent conception aside from any mechanical interference.

Acute antelexion of the cervix and pronounced retroversion of the body of the uterus act similarly, by removing the cervix sufficiently far from the posterior vaginal cul-de-sac so that the discharge from a trivial vaginitis may destroy the spermatozoa before they have succeeded in effecting an entrance into the uterus.

It is very doubtful whether cervical stenosis, short of actual atresia, is alone capable of producing sterility, as the sperm cell certainly can penetrate any orifice sufficiently large to permit the outflow of menstrual blood, but it is conceivable that a combination of cervical stenosis and a tight-fitting plug of mucus might prevent the entrance of spermatozoa.

Any mechanical impediment in the uterus itself is improbable, but from the uterine end of the tube to its fimbriated extremity a minute lesion is capable of producing occlusion and so preventing conception. One diseased tube alone cannot be responsible for sterility, but tubal disease is so common and so universally bilateral that one is surprised that sterility is not far more frequent than it is, a preceding salpingitis likely being responsible for more cases of sterility than all other causes combined.

But little is actually known of those causes which might lead to imperfect ovules, but it can be surmised that they are many. In addition to discharging imperfect ovules the ovary may be the

subject of tumors, adhesions, or a thickened cortex, any of which might interfere with ovulation by preventing the discharge of ripened ovules at the proper period of their development, possibly retaining them indefinitely within a distended vesicular follicle.

Granting that the ovule and spermatozoid have met, the theoretical conception of fecundity thus having been established, *clinical* sterility may yet be brought about if the impregnated ovule fails to pass through the tube, become implanted in the uterus, and inhibit at least one menstrual period. A tube which allows passage to the spermatozoid may be too narrow to allow the passage of a fecundated ovule, in which event it may die, or lodge in the tube and be the direct cause of tubal pregnancy. The fecundated ovule may enter the uterus, but, owing to some disease of the uterine mucosa, fail to implant itself, or it may become implanted and cast off at the next menstrual period.

From clinical observation only, it has appeared to the author that the last-mentioned possibility is responsible for no inconsiderable number of cases of apparent sterility, many sterile women having now and then a period somewhat delayed, finally menstruating rather profusely and with more than the ordinary amount of pain. If this view is correct, such patients actually are not sterile, but on the contrary are the victims of menstrual abortion.

Interstitial and glandular endometritis may produce sterility through the ovum failing to become imbedded in the diseased mucosa. Fibroid tumors fortunately induce such a degree of endometritis as to prevent conception in a large proportion of cases, and any disease of the uterus which leads to the condition termed "hemorrhagic endometritis" is usually incompatible with pregnancy. It is in this way that marked displacement, frequent coitus, and other causes of repeated pelvic congestion sometimes operate to induce sterility.

Contrary to a widely held opinion, neither orgasm nor sexual

excitement on the part of the female is necessary to impregnation, the latter having taken place when the woman was unconscious, but it is likely that fecundation is rendered more probable by the flooding of the vagina with alkaline mucus which is induced by sexual excitement.

The rôle played in the production of sterility by general diseases such as syphilis is undoubtedly of considerable moment. Syphilis is known to be one of the very common causes of abortion, miscarriage, and premature labor, and it is not unlikely that it may inflict sufficient damage upon the ovule to prevent conception.

Syphilis of the endometrium may prevent implantation of the ovum or cause its discharge at so early a date that pregnancy was not suspected.

Treatment of Sterility.—It should be remembered that not all instances of presumed sterility are the fault of the female, many cases of male sterility being due to congenital defects, double epididymitis, and damaged spermatozoa by reason of gonorrheal urethritis and prostatitis.

In the female, sterility whose origin is known obviously may be curable or incurable, and the same can be said of sterility whose cause is surmised only.

The plain course in an individual case is to remove any removable obstacle to conception, but even then many instances will remain in which the patient remains sterile without apparent reason.

Vaginismus, atresia of the vulva and vagina, and stenosis of the cervix, should be overcome by the methods outlined.

Hyperacidity of the vaginal secretions, vaginitis, endocervicitis, and endometritis, are all amenable to treatment, as are sharp cervical anteflexion and marked retroversion. Specific salpingitis cannot be so treated as to permit of future pregnancy in any but the most limited number of cases, and conservative operations upon occluded tubes more frequently lead to secondary operation than to future conception.

Imperfectly developed ovaries and disorders of the ovule itself can be imagined only, and if our conception of the cause is correct, nothing is to be accomplished by treatment unless the patient is syphilitic.

Women suffering from dysmenorrhea with a scanty flow from an infantile uterus, may in the future be benefited by knowledge derived from researches into the functions of the pituitary and thyroid, but at present we know too little to dogmatize.

There remains a fair number of women who either do not become pregnant at all or who abort at the next menstrual period, whose past history is clear so far as infection is concerned, who menstruate normally, and in whom examination reveals neither congenital anomaly, displacement, nor disease. It is these patients who provide an excuse for a thorough dilatation of the cervix with sharp curettage of the uterus, followed by a prolonged period of weak alkaline douches, and they provide this excuse because operation is successful in a very moderate percentage of cases. A cure should never be promised, but if the patient desires everything done which is possible operation is indicated in the absence both of the history and physical evidence of preceding inflammatory disease.

The use of the intra-uterine stem pessary as a cure for dysmenorrhea and sterility has recently been revived, but it seems to succeed best in the hands of those who are responsible for its rescue from oblivion.

Syphilis can be so treated as to overcome the disposition to repeated abortion, and anti-syphilitic treatment may remove an otherwise inexplicable sterility.

The other general diseases which cause sterility should be treated on their merits, but not many of them are amenable to any form of treatment.

GONORRHEA

Under appropriate headings there have been described the inflammatory processes which are produced by the gonococcus

of Neisser. Only a brief résumé of the etiology, life history, clinical course, diagnosis, and treatment of gonorrhea as a whole will therefore be undertaken at this time.

Gonorrhea of the sexual organs is rarely acquired by the adult in any way other than sexual intercourse, although there are well-authenticated instances of its acquisition by the use of infected instruments, douche bags, etc. Vulvo-vaginal gonorrhea in infants and young children seems to partake more of the nature of a contagious than an infectious disease. It is, of course, sometimes acquired by sexual contact, but bathing and handling by infected nurses, and conveyance of the disease from one child to another in a fashion that seems almost uncanny results at times in virulent epidemics in institutions. When this takes place the most extreme measures may not stamp it out in the infected, and all known precautions fail to prevent the incidence of new infections.

Although his stand may seem extreme, it is the belief of the author that once gonorrhea is acquired by any individual, infant or adult, it never is completely eradicated.

The clinical course of gonorrhea is dependent upon the virulence of the infection and the organs involved, and to a very great degree is separable into two classes, acute and chronic, each of these again being divisible into gonorrhea of those structures external to the internal uterine orifice, and gonorrhea of those organs above the internal uterine orifice.

Again, while gonorrhea affects mucous surfaces almost exclusively it may invade serous membranes as a gonorrheal peritonitis, pleuritis, or arthritis.

The symptoms of acute gonorrhea are those of an acute purulent inflammation of the surfaces invaded, and as above stated, they are of two widely different types dependent upon whether or not the infection extends above the internal uterine orifice. The smarting and burning of acute specific urethritis is well understood; invasion of the Bartholinian glands give rise to acute Bartholinitis which frequently ends in abscess formation;

gonorrheal proctitis causes burning about the anus with frequent painful efforts at defecation. Gonorrheal vaginitis in the adult is not often seen, the next step higher being taken as gonorrhea of the fornix of the vagina and mucosa of the cervical canal. In acute gonorrhea these are all accompanied by a discharge of the typical iodoform yellow, irritating pus, in which the diplococcus of Neisser is found both free and in the pus cells.

In the course of time, and either with or without treatment, this merges gradually into the chronic or latent form, in which there usually is a trivial sero-purulent urethral discharge to be obtained by stripping, or a drop may be expressed from the para-urethral ducts. A little reddened spot marks the openings of the Bartholinian ducts, and the glands themselves may give evidence of preceding inflammation by the formation of cysts, chronic abscesses, or palpable thickening. Chronic or latent infection of the cervix gives rise to a ropy mucopurulent discharge, with or without erosion of the vaginal face of the cervix, erosion however being a usual concomitant of gonorrheal endocervicitis. It must be remembered that the latent or chronic form of gonorrhea of the lower genitalia may be such from the beginning, and that a definite history of acute disease is not at all necessary to establish a diagnosis of chronic gonorrhea.

It has seemed to the author that this form most commonly is caused by gleet in the male, and that women who marry men presumptively "cured" of their gonorrhea of years before are most likely to be its victims.

In the discharge from any of these localities the gonococcus sometimes is demonstrable as the typical intracellular diplococcus, while in other cases of known gonorrheal origin it is never found.

In the chronic or latent form, therefore, the presence of the gonococcus is indubitable evidence of infection; its absence means nothing.

There are times, too, when patients at this stage of infection may convey it to others, and times when the infection seems

innocuous, but altogether it persists indefinitely, and without a doubt gives rise to ophthalmia neonatorum in the new-born infants of such patients, while after labor it is the source of many otherwise inexplicable cases of puerperal infection. Whether the gonococcus can enter the blood stream and cause pleurisy arthritis, and periostitis, if the original infection has not extended beyond the internal os, is uncertain.

The life history of acute gonorrhea which has extended above the internal uterine orifice is much more definitely established.

Acute endometritis of the body of the uterus, followed almost immediately by acute salpingitis, is the usual outcome. Here the results are beyond the reach of medication, and the inflammation tends to remain localized while the gonococci die out in the uterus and tubes.

The gonococcus is rarely found in the uterine mucosa after the subsidence of acute symptoms, and never is found in sealed tubes for more than a few months after the primary salpingitis has taken place.

The brunt of the inflammatory process is borne by the outer extremity of the tube, the uterine end frequently appearing to be normal, and recurrent salpingitis is not to be explained by a lighting up of the tubal inflammation, but rather by recurrent endometritis and re-infection of the uterine end of the tube.

Those cases of salpingitis which have their origin in acute gonorrhea are acute and brusque in accordance with their acute source, while those which develop from the more slow going latent form may be so mild that the symptoms are almost entirely overlooked.

Even in the most acute form of gonorrheal vulvo-vaginitis in infants the inflammation but rarely extends into the uterine body, and gonorrheal salpingitis and peritonitis in infants are so rare that but an occasional case is recorded in the literature.

The diagnosis of gonorrheal endometritis is never correctly made because the salpingitis which follows it obscures any symptoms which might otherwise exist.

The diagnosis of gonorrheal salpingitis is sufficiently considered under that heading, but it should be remembered that bilateral disease speaks in favor of a specific origin, that with the abdomen open if it is apparent that the brunt of the process has been borne by the tubes rather than the ovaries, gonorrheal infection is almost certain, and that any mysterious, acute, bilateral inflammation, not accounted for by a plain septic infection, is gonorrheal on the scale of chances. The value of the complement-fixation test in the diagnosis of obscure gonorrhea is still uncertain.

Treatment.—It is a matter for regret that vaccines have so limited a field of usefulness for disease affecting mucous surfaces, but up to the present this certainly is true.

The treatment of gonorrhea is, therefore, entirely a local problem, and while it cannot be cured its annoyances can be mitigated and the disease itself be made to assume the latent form in which it is much less troublesome. Gonorrhea affecting the organs above the internal uterine orifice is a surgical disease exclusively, and the most important thing to be borne in mind in the treatment of gonorrhea below this zone is to do nothing which might cause it to extend higher. If the vulva alone is involved the vulva only should be treated, and in gonorrhea of the cervix, nothing, neither sound, curette, irrigator, nor medicine, should pass the internal uterine orifice.

In hyperacute cases of gonorrhea rest in bed is essential. As soon as the acute symptoms begin to retrogress the application to the diseased areas of the most efficient gonococcide should be commenced. Up to the present time silver nitrate solutions occupy this field almost to the exclusion of any other.

It occasionally happens that any drug used persistently loses its efficacy, and when progress is not apparent the vagina and cervix may be swabbed with tincture of iodine and the organic silver salts used in the urethra and about the vulva. Occasionally a case is seen which does better by the use of drying powders and frequently repeated light gauze packs,

and the destruction of cervical glands by the cautery should not be overlooked if cervical discharge is persistent, but on the whole silver nitrate in varying strengths is our chief reliance in the treatment of gonorrhea limited to those parts of the female genitalia inferior to the internal uterine orifice.

THE TREATMENT OF MENSTRUAL DISORDERS

Under the general subject of Symptomatology the various disorders of menstruation have been discussed and emphasis laid upon the fact that all of them are purely symptomatic. "Remove the cause" is a medical dictum which it is impossible to obey at times, but in the treatment of menstrual disorders every effort should be made in this direction. Instances are observed, however, in which the etiology of the menstrual anomaly is not clear, or if known, is not removable. Under such circumstances the same attention must be given to symptomatic disturbance as would be given to a known disease entity.

Amenorrhea.—In congenital absence of the uterus or ovaries it is obvious that nothing can be done. In genital atresia appropriate treatment comprises whatever operative measures may be necessary to provide an outlet for the retained secretions. In chlorosis, iron in any form acts like a specific, and none of the new preparations have any better effect than the old-time Bland pill, especially when given with minute doses of aloes. Five to 10 grains of freshly prepared Bland's mass combined with $\frac{1}{100}$ grain of aloin, and taken three times daily, produces as satisfactory results as any of the modern preparations. Manganese binoxid, potassium permanganate, oxalic acid, and apiol are reputed to have some specific effect upon the menstrual function, but cases are rare in which such action is necessary even if possible, providing the primary disease is amenable to treatment. Prolivity in the use of drugs is usually an evi-

dence of paucity of ideas concerning the indications for their employment.

It is possible that the stem pessary might prove useful in a patient whose ovaries were normal but whose uterus was infantile in size.

The most puzzling cases are those associated with the sudden onset of obesity. In the past we have been entirely in the dark concerning the etiology of the disorder, but recent investigations give hope that the suspicion directed toward the internal secretions is correct, and that pathological processes in the pituitary body, the thyroid, and possibly the corpus luteum, are responsible for the amenorrhea, which after all may be but one of the evidences of disturbed metabolism. Should this be true, palliation and even cure will be made possible in some cases through the use of extracts of these organs.

Dysmenorrhea.—The treatment of dysmenorrhea may be divided into that for the immediate relief of pain, and that for the cure of the condition upon which the pain depends. Narcotics should be avoided excepting in the severest cases and when the pain is absolutely unbearable, and they should never be given more than once or twice to the same patient. It must be remembered that most patients who have dysmenorrhea are neurotic, that the pain recurs periodically, and that it may persist over a protracted period in spite of treatment, all of which is peculiarly favorable to the formation of a narcotic habit.

In the ordinary case general sedative measures without opiates give sufficient relief.

The hot sitz bath or full tub bath, continued until general relaxation occurs, is of great value and should be taken so soon as the pain begins and be followed by rest in bed with the application of a hot compress, the hot-water bag, or electric pad, to the lower abdomen. The bromides act well in some cases if given in full doses for two or three days before the flow begins, but their action is too slow to have any effect if given after the onset of the pain. The coal-tar products are probably the best

analgesics to use. Of these acetophenitidin is the safest if administered in 5-grain doses, repeated every two or three hours until relief is obtained. Antipyrine has a more powerful anti-spasmodic effect, but the patient must be watched for the development of untoward symptoms. Preparations of viburnum have a wide vogue and have the merit of being harmless. In some instances they seem to be of value, but the proprietary preparations should be scanned carefully to see that they do not contain opium nor a dangerous quantity of alcohol. The latter drug acts very well indeed in spasmodic dysmenorrhea, but is objectionable for the same reason that opium is.

Curative treatment depends entirely upon the condition responsible for the pain. Obstruction should be treated surgically, as should the congestive form when due to disease of the tubes or ovaries. Membranous dysmenorrhea is recalcitrant to any form of treatment, but sometimes yields to repeated curettage and dilatation of the cervix.

The common spasmodic form is frequently made the indication for dilatation and curettage, a procedure which occasionally cures but more frequently fails to accomplish any permanent good. Usually the pain is absent for from one to three periods after dilatation and then recurs as severely as before, and it is not uncommon to have patients apply for treatment who have been dilated and curetted a number of times without the slightest permanent benefit. Whatever the actual cause of the painful uterine contractions may be, whether hyperæsthesia of the uterine nerves increased by pelvic congestion, pressure of the opposed uterine walls upon each other, or swelling of the mucosa about the internal uterine orifice, in the absence of actual disease of the endometrium curettage is distinctly not indicated unless an unaccountable sterility co-exists. Should curettage be followed by pregnancy, permanent mitigation of the suffering, but not absolute cure, can be promised. But one measure in the author's hands has been followed by success often enough to justify its routine adoption, and that is galvanism with one elec-

trode in the cervix and the other over the abdomen. Three or four 10-minute seances between the periods, using 10 milliamperes of current, almost uniformly gives relief for a considerable time and is perfectly safe providing the cervical electrode does not pass through the internal uterine orifice. It is evident that even this method of treatment is objectionable in virgins, but in a small proportion of them some relief must be obtained even though it involves disagreeable exposure and embarrassing methods of treatment.

General measures are always advisable, and are such as serve to keep the patient's general health in the best possible condition. Constipation should be overcome, anæmia combated, and nerve-racking work or study modified or forbidden according to the severity of the case. Late hours and dancing are to be avoided immediately before the onset of menstruation, and too close association with the opposite sex must be absolutely interdicted if therapeutic measures are to be of any avail.

It occasionally happens in neurotic married women that nothing gives relief and the patient is made an invalid for five or six days in every month. These patients usually are permanently sterile, and while more or less wretched all of the time they are so much worse at the menstrual periods that operative measures are necessary to put a stop to the recurrent exacerbations of pain. In these cases removal of the ovaries has been practised, but the results are deplorable in that the patient's nervous condition is made worse even though the pain ceases. Removal of the uterus is the correct procedure when menstruation is to be permanently abolished, since the nervous condition is not exaggerated by this operation while the recurrent dysmenorrhea is cured. Fortunately such extreme measures are rarely indicated, but in a large number of patients with menstrual pain, one is occasionally observed that cannot be relieved by anything short of the abolition of menstruation.

Menorrhagia and Metrorrhagia.—The treatment is always that of the underlying cause, but occasionally the bleeding is so

alarming that measures for its immediate control are necessary. Bleeding from the non-puerperal uterus can be checked by snug packing of the cervical canal and vagina. In mild cases very hot prolonged douches usually suffice and are not so painful as a packing which is sufficiently tight to be of value.

If the bleeding point is in the vaginal portion of the cervix astringents should be added to the water used for douching. The best of these are tannic acid, acetic acid, and acetate of lead, in the proportion of 1 dram to the pint. The powerful hæmostatic effect of adrenalin may be utilized when the bleeding area is small and suitably situated for local application, but if the hemorrhage is from the body of the uterus local applications and astringent douches are of no value. Ergot and pituitary extracts are useful in bleeding which is the result of myomata and congestive conditions, such as subinvolution, but they have little or no effect in endometritis and malignant disease. Calcium chloride, a dram daily in divided doses, taken well diluted, is presumed to shorten the coagulation time of the blood and so assist in the control of hemorrhage, and more recently the hypodermic use of an alien serum, or if this is not available, of diphtheria antitoxin (merely for the serum effect), has been authoritatively recommended and is worthy of trial in a desperate case. The danger of the production of anaphylaxis by repeated injection of serum must not be overlooked. The oral administration of styptics and astringents is useless and should be avoided for this reason. Finally, every case of more than the most moderate grade of severity should be confined to bed until the bleeding is over, both to modify the bleeding and conserve the general health.

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CHAPTER XVII

GYNÆCOLOGIC THERAPEUTICS

There are two ways of regarding a patient who is the victim of one of the diseases which come under the observation of specialists. In one the patient is merely a case of the disease presented, in the other the patient is an individual who is the subject of a disease. The latter attitude is the correct one, since, for example, a patient with a gynæcologic lesion or abnormality has not only a heart, lungs, kidneys, and stomach, but more especially she has glands of internal secretion and a central nervous system, and any of these may be diseased independent of her pelvic disorder.

It is a common failing to overlook this fact, and to attempt to cure the patient by measures directed solely to the abnormality coming under the specialty which happens to be the one favored by the physician under whose observation she has fallen, and this narrow attitude is responsible, not only for many failures to cure, but for much severe criticism as well. This error perhaps is more widespread in the practice of gynæcology than elsewhere, since a woman is only too likely to consider her mysterious womb and ovaries as the source of all the ills to which she is heir.

As a matter of fact more women suffer from the disease known as modern civilization than from diseases of their generative organs, and even if the latter are cured the patient is in no wise relieved of the stress and strain imposed by her duties to her husband and children, her financial responsibilities, and her presumed social obligations.

While there are a few drugs, like ergot and pituitary extract, which have an especial or specific action upon some of the

female organs, there are a number of hygienic and therapeutic measures which must be utilized if one is to cure the patient who has a disease of the genital organs.

Some of these measures, too, need to be directed against conditions which are at least quasi-gynæcologic in their origin. The mental strain under which some women labor as the result of fear of the frequent repetition of pregnancy is tremendous, and the state of sexual erethism into which others are thrown by repeated incomplete coitus and its effects upon their nervous systems is deplorable although rarely mentioned.

The sterile woman is usually very unhappy also, and brooding over her childless state may do her infinitely more harm than the lesion which caused sterility. Many things must be considered if one is to cure his gynæcologic patients, some of which are correlated to her pelvic organs while others really bear no relation to them.

Under the head of general therapeutics must be considered such measures as rest, exercise, hydrotherapy, massage, and suggestion.

Rest.—At the present time what most women need is rest from one set of activities and exercise of another, but some conditions demand cessation from every sort of activity, both physical and mental, and this can be secured only in a well-regulated sanatorium. Such patients really belong to the nerve specialists as instances of functional neuroses. However, even neurotic women who have gynæcologic abnormalities and disease should have their gynæcologic pathology permanently removed, as a source of constant irritation to the nervous system is thus done away with, and especially because the mind can better be put at rest after the cure of a local disorder than it can if a dreaded ordeal remains to be confronted.

The great efficacy of change of scene and of climate in overcoming the nervous disorders which are associated with pelvic disease, is due to the relief from petty daily worries as well as the truer perspective which a patient obtains when removed

to a distance from her problems. In functional disorders less grave than actual neurasthenia or major hysteria much good is accomplished by a vacation period entirely away from the routine and humdrum of everyday life. Some pelvic disorders of themselves demand absolute rest in bed. Acute inflammatory processes and profuse hemorrhage require this as the first step in their treatment, and recurring congestion of the pelvic organs, due to displacements of the uterus and chronic inflammatory disease of the tubes and ovaries, is best met by rest until the discomfort ceases.

To tell a mechanic's wife who is attending to her own household duties and caring for three or four children that she should rest in bed is cruel, because for her this is impossible, and only too frequently her complaints of ill health are regarded by the family as an evidence of laziness. It is in women of this class that such wonderful results are obtained by minor operative procedures, not as the consequence of operation, but because the patient has rested both physically and mentally and has had the novel experience of being the recipient of every attention instead of the one who gave it.

Curettage has obtained a place of vast importance in the mind of the pseudo-gynæcologist whose creed is, "Here's a uterus, let's curette it," and as his patient improves thereafter he at once jumps to the conclusion that the little instrumental meddling with the endometrium was responsible. To attain a proper view of the efficacy of this and many similar procedures, every practitioner of a surgical specialty should at some time have been a general practitioner. While this might not benefit his manual dexterity and operative ability, it would give him a broader view of the indications for operation and the results which are obtained by surgical procedures.

It is not justifiable to frighten a patient with the threat of an operation whose beneficial results are largely attributable to enforced rest, catharsis, etc., but many women with minor gynæcologic disturbances need just such surroundings and sub-

sidary treatment as is necessitated by the preparation for operation and its after-care. To send such patients to the hospital for two or three weeks for observation or treatment is a wise plan and a justifiable subterfuge in order that the needed rest may be obtained, but operations of any sort should not be performed unless definitely indicated.

Wholly aside from any attempt at the rest cure or hospital attention, a certain amount of daily rest is necessary, and this varies somewhat with the individual. Normally this is taken as sleep, and failure to secure that amount of sound refreshing sleep which each individual needs soon sets the nerves on edge and results in the magnification of any existing petty ailment.

The habit of resorting to hypnotic drugs as a routine is easily established, and besides the injury done by the drug itself there is the added damage of loss of self-control from the constant dependence upon it. Many apparently trivial measures help to overcome sleeplessness, and among the most useful is the habit of complete physical relaxation after retiring. This in itself is restful and minimizes the discomfort arising from loss of sleep, while it naturally tends to promote drowsiness. Exclusion of light, even to the extent of wearing a bandage over the eyes, and exclusion of sound by plugging the auditory meati, both serve to prevent external influences from reaching the cerebrum.

A warm bath before retiring promotes rest with some persons, and a bath followed by thorough body rubbing, when massage is not available, is often followed by a sound sleep.

The avoidance of tea and coffee at dinner enables some nervous individuals to sleep without difficulty, a fact which they learn for themselves without medical advice.

The occasional use of drugs to tide over an acute crisis of wakefulness or anxiety cannot be avoided, and those least harmful and least likely to induce a habit should be tried first.

A heavy dose of one of the bromides at seven or eight P.M. on two or three successive nights will often start the habit of resting

and supplant a beginning habit of wakefulness. This is particularly true of those who have been "keyed up" to meet an emergency and need only to be set right before the habit of lying awake becomes fixed. Large doses of the bromides are not injurious if used for a short time only, and 30 grains of sodium bromide for three or four nights in succession can do no possible harm. The bromides are entirely useless if actual pain is a factor in causing insomnia.

The newer products, such as trional, sulphonal, and veronal, are usually safe so far as their immediate effects are concerned, but a habit is readily established for any of them. Trional and sulphonal have the further disadvantage that their soporific effect is sometimes delayed for many hours, so that the patient who takes them lies awake at night and is persistently drowsy throughout the succeeding day. Altogether they are better avoided in the class of cases under consideration, bearing in mind that we are dealing only with such persons as are temporarily under gynæcologic observation, and who are simultaneously suffering from lack of rest and sleep.

Exercise.—Those patients who take the true rest cure secure their exercise in the form of massage scientifically given by an expert, but most gynæcologic patients are improved by massage and passive motion during their stay in bed after operation, even if these are given imperfectly. It may seem ridiculous to the seamstress who uses a foot-power sewing machine, or the mother of a family who works the most of her days, to be advised that she needs exercise, but such is often the case. At times it is not the muscular exertion which is needed so much as the open air, but there can be no objection to obtaining both ends simultaneously. Standing or sitting all day is one of the most trying things possible, and many patients with pelvic pain from passively congested veins in the pampiniform plexus find relief from a brisk walk, precisely as do men who have varicocele.

Exercise is best taken as a diversion and not as a duty. Thus games, gymnasium work, and even dancing, are often beneficial.

Dancing, however, is so frequently associated with crowded, hot, stuffy rooms, and insufficient or improper clothing, that its dangers outweigh its benefits. Active exercise in the presence of gross disease is almost always impossible, or at least injudicious, but the indefinite, ill-defined aches and pains in the pelvis which patients choose to believe are organic in their origin, are more satisfactorily handled by reasonable hygienic measures than by strictly gynæcologic treatment.

Hydro-therapy and massage are both valuable resources in well-equipped sanatoriums, but in private gynæcologic practice they are rarely available. One minor hydro-therapeutic measure is, however, of great value and almost universally possible, that is, the cold spray in the treatment of constipation. There is no question that the sudden application of cold to the abdomen quickens peristalsis. Advantage may be taken of this by the use of a simple nozzle upon a rubber tube attached to the cold-water tap on the ordinary bath tub, the daily bath being followed by spraying the entire abdominal wall with a stream of water applied with considerable force.

Suggestion.—Suggestion is the most powerful auxiliary force in the management of any disease not necessarily fatal.

Suggestion is at the bottom of every cure effected by Christian Science, sacred pilgrimages, and the laying on of hands, and in daily life is the basic factor underlying the production of many apparently remote results. For example, the assurance, stated in terms of positive conviction, that a patient would recover from a given disease has helped more than one past a crisis which otherwise might have been fatal, and the amount of reserve nervous energy which may be brought to bear in this manner is often surprising. The time for its most successful employment is when the patient is under regular observation when the routine truthful encouragement day after day eventually makes its influence felt even in prolonged chronic illness.

While it is in functional nervous disturbances and under the care of the trained neurologist that this method is of special use

it can be applied in a modified form to meet the daily exigencies of practice among women, but few of whom are the victims of organic disease alone. Fear of the unknown, and to them the unknowable character of their illness and its outcome, is many times productive of more genuine misery than that caused by the physical disease, and the allaying of this fear becomes at once a source of comfort while it operates indirectly in securing complete recovery.

An anæmic woman from whom a bleeding fibroid has been removed will convalesce more quickly if assured of recovery, and her anæmia will improve more rapidly because her appetite and digestion are better, and her sleep not disturbed by anxiety over the outcome. In this way some surprising results may be secured, but an ovarian cyst will not cease to grow, a fibroid uterus to bleed, nor a carcinoma to invade contiguous structures, no matter what form of suggestion is used, although under its influence the patient may for a time ignore all evidences of the progress of disease. The practical lesson to be drawn from these facts is, that we should remove or otherwise cure any tangible pathological conditions which are productive of ill health, and then assist recovery by appealing to the power of suggestion to remove the phobias, fears, and dreads, which magnify every minor symptom into something of major importance.

Vaccines, Antitoxins and Specific Chemical Therapy.—Twenty-five years ago, while a medical student, the author heard Victor C. Vaughn make the startling statement that the next great advance in medicine would be made on the basis of chemical discoveries. At that time surgery was progressing so rapidly, not only because of the discovery of the bacterial origin of infections but also by the development of practical methods of preventing them, that Vaughan's prophecy sounded ridiculous.

In this short time, however, there has arisen a virtually new nomenclature in medicine through the activities of the physiological chemists, and the world is undoubtedly on the eve of

further discoveries which will revolutionize the management of bacterial disease. More than this, the practical proof by Ehrlich that enormous quantities of poisonous drugs may be given with impunity, once the chemical affinity of certain elements in the drug for specific cells in the body is known, opens up an almost incomprehensible field for speculation.

So far as the researches in immunity, vaccination, serum therapy, and specific chemical therapy concern pure gynæcology at the present moment there is little to be said, but the student must be fully abreast of the times in his knowledge of these subjects if he would grasp their importance when the moment arrives that they can be applied to a whole class of gynæcologic ailments.

One may, perhaps, say that the use of autogenous vaccines is indicated in persistent mild infections about the vulva and vagina, and that chronic *draining* intra-abdominal infections may be managed with safety in the same manner.

Stock vaccines which correspond to the bacterial species present are sometimes successful, but the tendency to make a routine vaccine prescription fit an individual case is not likely to prove satisfactory. Even dead bacteria carry a considerable percentage of proteid with them, and the profound effect which may be produced by the injection of minute quantities of foreign proteid, by sensitizing the body cells to a later dose, has been convincingly shown in the experimental production of anaphylaxis.

The treatment of gonorrheal infection by vaccines and sera is still sub judice, and the use of anti-streptococcic serum in severe streptococcus infection has almost been abandoned, save in enormous doses and as a last resort. What we are dimly beginning to comprehend of the problems of immunity and infection has given a certain scientific basis to things which were once regarded as whimsical notions, and it is possible that the old fixation abscess treatment for severe generalized infections may again come into vogue.

On purely empirical grounds two methods of treating severe generalized infections have been advised which after all may prove not to be unscientific. The beneficial results which seem to have been obtained by the intravenous injection of magnesium sulphate solution in obstetric bacteremia are scarcely open to doubt, and the method deserves a trial in all infections in which streptococci can be demonstrated in the blood.

Whoever may have been the originator of the idea, the surgeons of the New York Lying-In Hospital have developed the method most carefully, and it has been found that the solution is best given in 1 per cent. strength in recently sterilized distilled water. Of this solution 6 to 8 ounces may be given with safety by any accepted method of intravenous medication, if it is given very slowly. How it acts is unknown, as magnesium sulphate *per se* is practically devoid of antiseptic power, but again, Ehrlich's chemical cell-affinity theory may in time offer a satisfactory explanation.

The other method, which has been tried and rejected by many, has as its advocate the surgeon Crede, and consists in the introduction of colloid silver intravenously, per rectum, or by inunction. The proprietary nature of the preparation and some rather questionable advertising might well make one hesitate, but on the principle of "any port in a storm" the author has used collargol intravenously in a number of cases which to all appearances were bound to end fatally. Some of these recovered, and because of the belief that an explanation of this may sometime be found, either in the specific character of the bacteria responsible for the infection, or else in the production of a chemical immunity in those body cells which were proving least resistant to the infection, he is inclined to advise its use.

In a general way, then, those grave infections without marked local inflammatory foci, in which streptococci are found in the blood, or even when they are suspected only, should be given the benefit of possible help by the intravenous use of one of these chemicals, always bearing in mind that the basis for

their use is as yet empirical, and that the supposed results may be coincidences only.

Local Therapeutics.—The “local treatment” of gynæcologic disease is tremendously overdone. All that can be accomplished in this manner is the cure of surface lesions by the production of hyperæmia, the direct application of the cautery, antiseptics, astringents, deodorants, etc., together with a somewhat uncertain influence upon deeper processes through the application of moist heat and hygroscopic agents like glycerin.

To these perhaps should be added the effect of support and pressure upon displaced and passively congested organs, and the relief sometimes afforded by local blood-letting.

Local therapy further should be confined to such applications as can be made to the vulva and vagina, intra-uterine applications made at the office being far more dangerous than the diseases for which they are used.

Liquid applications to the vulva should be made by means of cotton-wrapped applicators or pieces of cotton held in forceps, and care should be taken not to stain the underclothing. Drying powders can be sprinkled on the vulva by means of dusting cans.

Applications to the vagina and vaginal face of the cervix can be made through the ordinary bi-valve speculum, through the cylindrical glass speculum, or by placing the patient in either the Sims’s or knee-chest posture and retracting the perineum. Dusting powders are sometimes used in the vagina, but without a powder blower some difficulty is met in making their application uniform.

Suppositories are sometimes useful to convey medicaments to the vagina and vaginal face of the cervix, but they are rather messy. The use of tampons of gauze or cotton, saturated with the drug or solution which it is desired to apply, is the most popular method of making applications to the upper portion of the vagina, while the vaginal douche, as a method of promoting cleanliness or using astringents and antiseptics as well as apply

ing heat, is generally used by the patient herself under the physician's direction.

Before discussing local applications let it be understood that they should not be used without some definite idea as to why and what they are expected to accomplish, the routine prescription of a daily douche, with semi-weekly visits to the physician's office to have a tampon applied for "womb trouble," being not only farcical, but unjust to the patient and detrimental to scientific medicine.

The galvano-cautery finds its principal application in endocervicitis with erosion of the vaginal face. The small cautery blades used by rhinologists are perfectly adapted to this purpose, and two or three light stripes should be made from well up in the cervical canal, out to, and extending across the eroded mucosa. This should be repeated every ten days or two weeks on another portion of the cervix. The only especial care that is necessary is to see that the cautery point penetrates well into the mucosa but not into the muscular tissue. The treatment is painless and eminently satisfactory. Nabothian follicles can be punctured and destroyed with the same instrument.

Local blood-letting by means of multiple punctures into the vaginal portion of the cervix, is indicated in passive congestion as revealed by a bluish or purple appearance of the cervical mucosa. These punctures should be made with a sharp knife, a dozen or more punctures at one sitting, and bleeding is encouraged by the application of warm saline solution. Usually one or two treatments suffice to temporarily overcome the condition and relieve the patient of the profuse mucous leucorrhea which is nothing but a hypersecretion of the cervical glands. The same process of local blood-letting assists in reducing the size of hypertrophied lacerated cervices containing large amounts of cicatricial tissue. In the days when trachelorrhaphy was practised more extensively than at present, this form of depletion, together with painting with iodine and the boro-glycerid tampon, was used to reduce the cervix to normal size before repair was

attempted. At present it is felt that cervical amputation should be done in many cases in which repair was formerly made, so that preliminary treatment is no longer needed, but patients who are in the early child-bearing period and have cervicitis from laceration are much relieved by a resort to this treatment from time to time until the age of probable fecundity is past, after which amputation can be performed without the probability of a subsequent laceration.

The depleting and hygroscopic effect of glycerin, when applied upon tampons to the vaginal vault and infra-vaginal cervix, has been taken without question and is so universally accepted that it probably is correct, although one is unable to entirely disabuse his mind of a suspicion that the watery discharge which results from the use of the glycerin tampon consists of water absorbed from the atmosphere, rather than from the patient's tissues. However, drugs applied to the vaginal mucosa are partially absorbed, and no better method of applying ichthyol, iodine, etc., has been devised than in solution with glycerin, but it is open to question whether there is any real effect upon the pelvic tissues from their absorption.

Tampons have a legitimate use in giving support to a uterus which sags, and so relieving the bearing-down feeling which a partially prolapsed uterus induces. Such tampons soon become matted and offensive when used dry and without any antiseptic agent, and boric acid dissolved in the glycerin moistening the tampons enables them to be retained longer than would otherwise be possible.

When used for support tampons should be applied with the patient either in the Sims's or knee-chest posture, both of which elevate the pelvic organs. The tampons should be soaked in the glycerin, squeezed out, and applied systematically around and over the cervix. Some gynæcologists prefer to fill the remainder of the vagina with other tampons of non-absorbent cotton or especially prepared wool, in order to furnish a better column of

support to the structures above, but this is essential in a few instances only.

Temporary retention of a uterus which has been replaced from a reposition can be accomplished by firm tamponade in *front* of the cervix. In this way one is sometimes enabled to establish definitely whether or no the displacement is responsible for the discomfort of which the patient complains.

Tampons for office use are made of one long strip of gauze, or of convenient sized pieces of absorbent cotton tied to a string, the end of the gauze or one end of the string projecting at the vulva for the patient's convenience in removal. Ordinarily they should be removed within 48 hours.

Tampons have a few well-defined uses, but their routine application,

for everything and anything, has led to the derisive name of "tampon specialist," being applied to many pseudo-gynæcologists.

Applications through the speculum are largely confined to the use of silver salts in gonorrheal cervicitis and the vaginitis which is produced by the cervical discharge. Strong solutions of silver nitrate are applied to the lower portion of the cervical canal and the tip of the cervix by means of cotton-wound applicators, and the entire vagina can be bathed in weaker solutions which are poured in through a cylindrical speculum. Before this is done all discharge should be wiped from the vagina. The speculum is lubricated with glycerin as oils and vaseline protect the tissues over which they are spread. The solution is poured into the speculum, which is then gradually withdrawn, thus bathing all portions of the vaginal wall as it collapses beyond the end of the instrument. Solutions as strong as 10 or 15 per cent. can be used for swabbing, and a 2 per cent. solu-

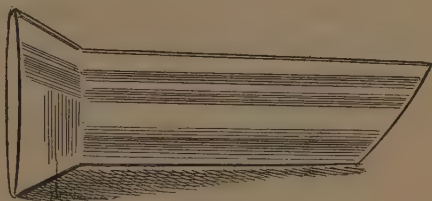


FIG. 233.—Cylindrical speculum.

tion may be poured into the speculum if none is allowed to come in contact with the vaginal orifice. A strong saline solution should be at hand with which to neutralize the silver nitrate if there is much pain from its application, and in any case the silver should be neutralized and washed away within a few minutes if it has been used freely.

Counterirritation to the vaginal vault for inflammatory disease of the tubes and ovaries is sometimes practised, and for this purpose tincture of iodine is most commonly used, followed by the application of a glycerin tampon. Like many of our therapeutic measures the effect is open to question, and in any event such treatment is not called for during the stage of acute inflammation.

In chronic cases this treatment may be practised at intervals of three or four days. It is possible that the counterirritation, together with iodine absorption, has some effect in hastening the resolution of inflammatory exudate about an inflamed tube or in the cellular tissue in the broad ligament bases, but no positive evidence of this can be adduced, as such masses undergo spontaneous reduction in size once the infection has subsided. Likewise the patient seems to improve and her subjective symptoms to disappear more rapidly while undergoing treatment, but whether this is from the treatment *per se*, or the psychic effect of expectation of cure, cannot be determined. That the latter is an essential factor is rendered probable by the fact that most patients relapse, in the sense that their subjective symptoms promptly return, after the conclusion of a series of treatments.

In favor of counterirritation we have the fact that skin hyperæsthesia is produced by inflammatory conditions in the abdomen, and it is quite possible that irritation of the sensory nerve endings over such hyperæsthetic areas may have a beneficial effect upon the intra-abdominal process. It certainly is true that a cantharides blister, painting with iodine, or the application of a mustard plaster lessens intra-abdominal pain, but such counterirritation is most useful over the anterior

abdominal wall, and its effect when applied to a vaginal vault which is not hyperæsthetic might well be questioned.

Vaginal Douches.—Moist heat and a variety of forms of medication can be applied by means of the vaginal douche, but the exact effect to be obtained should be understood when a douche is ordered, and this can be secured only if attention is given to a few details. There is some trifling risk in using the vaginal douche if a nozzle with an opening at the end is introduced too deeply. It would seem almost impossible for a patient to so place the douche tip as to inject the solution into the uterus, but such accidents have happened repeatedly. The ordinary result is a severe attack of uterine colic, but it can be readily seen that serious infection might ensue.

For purposes of cleanliness only the ordinary douche bag is necessary and the position assumed by the patient is unimportant, 1 per cent. warm salt solution, borax or boric acid in the same strength (roughly a teaspoonful to the pint) and sodium bicarbonate 1-2 per cent., all answer the purpose equally well. The last is somewhat more efficacious than the others for removing stringy mucus, and in sterility from hyperacidity of the vagina it sometimes effects a cure.

The prevalent practice of using carbolic acid and mercuric chloride solutions for the cleansing douche is dangerous, both from the possibility of systemic poisoning and the certainty of local irritation if the solution is too strong.

When an antiseptic effect really is required, permanganate of potash solution in a strength of 1-1000, lysol 1-200, and creolin 1-200, are all safer than either carbolic or mercuric solutions.

Tannic acid and pulverized alum are astringents which are often useful in the declining stage of cervicitis and vaginitis. These can be ordered in the proportions of a teaspoonful to the pint, the water used being either as hot as the patient can bear (about 115°F.) or almost cold.

Whenever an antiseptic or astringent effect is needed it is

desirable that the vagina should be thoroughly distended and that the solution should remain for some time after its introduction. If this is accomplished large quantities are not required, 1 or 2 quarts being sufficient. Distension can be effected by closing the vaginal outlet around the douche nozzle and allowing the fluid to escape from the vagina intermittently, and if the douche is taken with the patient in the recumbent position in bed a considerable quantity of the solution will be retained in the vagina.

Small douches are inefficient if the effect desired is that of prolonged moist heat. The prolonged application of hot fomentations to other portions of the body appears to be of use in stimulating absorption of inflammatory products, and doubtless a similar result can be obtained in the pelvis by the application of moist heat through the vagina. For this purpose the douche should be as hot as can be comfortably borne, and should be continued for a considerable length of time depending somewhat on the subjective effect on the patient. Some women are rendered weak and miserable by prolonged frequent douches, the effect being similar to that of frequently repeated hot baths.

If the patient is confined to bed and in charge of a nurse the prolonged douche is easily given with the ordinary appliances, the douche can or fountain syringe being continually re-filled.

If the patient must care for herself, however, no better method can be suggested than for her to lie in a bath tub having a douche tube and nozzle attached to the mixer on the water tap, a necessary precaution being that the water shall be at the proper temperature and the degree of heat stationary, or a bad burn may result. In this manner the patient can lie in comfort while the douche is continued for a period of from 15 to 30 minutes if no general bad effect is produced.

A wider application of moist heat is obtained by the sitz bath, in which the patient's hips and pelvis are immersed in hot water for from 15 to 20 minutes. This is more generally useful for acute menstrual suppression than for anything else, but it is

also applicable to the relief of pain from chronic inflammatory pelvic lesions.

The general effect of moisture and moderate warmth upon the tissues closely resembles that produced by Bier's hyperæmia, and it is possible that some of the apparent good effects of douching really are produced by hyperæmia. Modifications of Bier's hyperæmia method are used upon the cervix by the application to it of suction cups which act in two ways; by forcibly removing secretions from the cervical canal, and by inducing artificial passive congestion through which it is presumed that the resisting power of the tissues is raised.

In the foregoing discussion of local therapeutic measures, it is understood that the methods described are such as the physician will use in his office or the patient at her home, and that the conditions are such that infections (other than gonorrhea from dirty instruments) are not to be apprehended. Douches or other applications after operative procedures are subject to all the risks incidental to post-operative infection, and perfect asepsis is necessary. While cleanliness of irrigator cans, douche bags, nozzles, etc., should be enjoined upon the patient who is to use them, perfect sterility in the surgical sense is neither practicable nor necessary in their household use.

The risk to others from using the same utensils, and the risk to the eyes if a gonorrheal infection is present, should always be mentioned. The author is cognizant of a case of virulent gonorrhea which was conveyed from one woman to another by the neighborly loan of a douche bag.

Radio-therapy.—The X-rays, radium, and meso-thorium are destined to occupy a field in gynæcology which as yet is not well defined. There is no doubt that the correct application of the X-ray modifies the course of uterine fibroids, and either the X-ray or radium should be used routinely after operations for malignant disease for their inhibiting effect upon recurrence.

Radium and meso-thorium have a profound effect upon some of the varieties of malignant disease to which they can be

directly applied. At present they cannot take the place of surgery in operable cancer, but in inoperable cases the occasional occurrence of a cure during their use lends encouragement to the view that further research and the development of exact methods will be productive of a more hopeful attitude than is now possible regarding the cure of malignant disease without surgery.

For a knowledge of the technique most generally useful in gynæcologic disorders, the reader is referred to the extensive reference table appended under the subject which is as yet too young to permit of dogmatic statements.

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CHAPTER XVIII

DISEASES CLOSELY RELATED TO OR ASSOCIATED WITH GYNÆCOLOGIC LESIONS

Urethritis.—Acute urethritis in women, as in men, is generally of gonorrheal origin. In the acute stage the chief complaints are burning and smarting with frequent urination. On examination the urethra may be somewhat reddened, but the pathognomonic evidence is presented by the discharge of pus from the meatus on stripping the urethra. In the female urethra there is no powerful cut-off muscle to prevent the external appearance of the discharge when only the vesical end of the urethra is involved.

Care is needed in order to distinguish a discharge from the urethra proper from one having its origin in the para-urethral ducts.

Treatment.—Urethritis in the female is more amenable to treatment than in the male by reason of the shortness of the urethra and the simplicity of its anatomical relationships. In the acute stage free dilution of the urine by the ingestion of large quantities of water, and the avoidance of alcohol and meat leads to prompt amelioration of the symptoms, while prolonged hot douches and hot sitz baths overcome the tenesmus. As the symptoms abate local applications of the silver salts should be made to the urethra, but unless cystitis is a complication these applications should not be made by injection lest the infection be carried into the bladder. A short small urethroscope is introduced, and through this is passed a cotton-wrapped applicator saturated with the solution which it is desired to use. In the more active stage a weak solution of protargol or a strong solution of argyrol may be applied every day or two, but as

the inflammation subsides these can be changed for a $\frac{1}{2}$ to 1 per cent. solution of silver nitrate.

If the para-urethral ducts are involved they should be split to their ends with a small knife and then touched with a strong silver solution or the solid stick.

Acute Cystitis.—Cystitis in women could be made the subject of a monograph, but only enough will be given here to point out some of the pitfalls in diagnosis and outline the treatment of the ordinary forms.

While it is conceivable that acute cystitis might be caused by descending infection from the kidney and ureter, or that it might be produced, as are some kidney infections, through the medium of the blood stream, it is a fact that practically all the cases which one sees are the result of an infection which ascends through the urethra or is introduced into the bladder by means of instruments. The organisms most frequently responsible for acute cystitis are the colon bacillus and gonococcus, and while other pus-producing micro-organisms are sometimes found, the urinary report, "motile bacilli resembling colon bacilli," is so common as to be monotonous. Gonorrheal cystitis is not so frequently encountered as in the male, probably because drainage is better than from the male urethra, and also because instruments and irrigations are not so frequently resorted to in the treatment of urethritis in the female. The factors of disturbed blood and nerve supply, such as follow hysterectomy, direct injury by catheters, over-distension and exposure, cannot be disputed, and they probably act by lowering the resistance to infection, the latter being easily supplied in the case of the colon bacillus by its constant presence about the anus and perineum.

The immediate result of acute infection of the bladder is an engorgement of the mucous membrane with blood, desquamation of the superficial layer of cells, and pus formation, just as in acute infection of mucous membranes elsewhere. Desquamation may be so extensive as to lead to superficial ulceration

and bleeding, the process usually being most severe about the base of the bladder.

Symptoms and Diagnosis.—The subjective symptoms of cystitis are few in number but striking in their intensity. Frequent painful urination and tenesmus, with aching about the vulva and low in the back, call attention to the bladder at once, the severity of the symptoms being dependent both upon the virulence of the infection and the portion of the bladder involved.

There may or may not be elevation of temperature and pulse, but a little increase in both is usual.

In acute cystitis the bladder is acutely sensitive to any sort of examination and cystoscopy is rarely called for, but if practised, flakes of muco-pus will be observed adhering to the engorged, reddened, bladder wall.

The urine in acute cystitis may be acid, alkaline, or neutral (unless there is retention it is not likely to be ammoniacal), and it is cloudy from suspended epithelium, pus, blood, and bacteria. On chemical examination there is always some albumen, the quantity being directly proportionate to the pus and blood present. It should perhaps be emphasized that filtering the urine to remove pus and blood does not remove the albumen as the latter is derived principally from the serum rather than the formed constituents which are removed by filtration.

Microscopically large patches of epithelial cells may be found, which are of the characteristic bladder type. If the case be very severe the smaller underlying cells of the bladder mucosa are present and may be mistaken for renal epithelium. Pus corpuscles are always present and blood cells are usually found, while the causative micro-organisms are observed in the centrifugalized specimen.

The diagnosis is easy if a careful history is taken and an examination made, cystitis itself being rarely overlooked, the real danger being that serious renal lesions may be thought to be vesical only. A patient with a history of gonorrhea or

of repeated catheterizations, especially after hysterectomy, who has frequent, painful urination and passes purulent urine, rarely has anything but acute cystitis *if the onset was sudden* and the symptoms of short duration.

Aching in the loins and sharp elevation of temperature coming on several days after the onset of the bladder symptoms may mean pyelitis, and probably do if the pain appears first on one side and a little later on the other. Involvement of the pelvis of the kidney may suffice to produce a few casts and more albumen than can be accounted for by the pus and blood alone, and involvement of the parenchyma of the kidney always causes a "shower" of casts and far more albumen than either cystitis or pyelitis.

Calculous renal colic causes sudden tenesmus and traces of blood and pus in the urine, but the intense pain of calculous colic, the disproportionately small amount of pus and greater number of blood cells, the absence of masses of bladder epithelium, and the absence of bacteria during the first attack, usually suffice to distinguish them, and if any doubt remains it may be dispelled by a radiogram. Acute hæmatogenous infection of the kidney has few points in common with cystitis, and a patient with the former presents a desperately ill appearance at once. Over-distension of the bladder, with pain, frequency, and dribbling, cannot be mistaken for cystitis if the patient is properly examined.

The course of acute cystitis is toward rapid spontaneous recovery although slight bladder irritability may remain for some time, but the possible extension of the infection upward to the kidney makes the disease more serious than is generally appreciated.

Treatment.—The treatment of acute cystitis is first of all, rest, the patient herself often volunteering the information that she is better at night. During the stage of acute inflammation medical treatment should be directed toward rendering the urine bland and keeping the bladder itself at rest. Con-

centrated urine is irritating, and for this reason the ingestion of large quantities of water and the use of the alkaline diuretics are indicated. Alcohol should be forbidden and the diet limited to milk, which promotes diuresis while it does not increase urinary acidity. The frequency of urination may be lessened by the use of bromides and belladonna, but opiates are needed if the pain is excessive. It is probable that urinary antiseptics is assisted by the use of hexamethylenamine although in very large doses this itself causes strangury. In any event it should be given with large quantities of water to prevent irritation of the stomach, and 10 grains may be given four times a day with safety. Methylene blue is reputed to be of value for the same purpose, but the staining of the patient's linen is so pronounced that it is somewhat of a nuisance. Hot sitz baths, hot douches, and moist heat applied above the pubes, all relieve pain and promote comfort, and thus hasten recovery.

Local treatment is not indicated during the stage of acute inflammation. Such treatment at this time is extremely painful, and installations, bladder irrigation, etc., are best reserved for the declining stage unless there is a great quantity of pus in the urine. An exception to the rule of no interference during the acute stage is to be made in patients who must for any reason be catheterized, when gentle irrigation after the bladder is emptied by the catheter seems to be of benefit. As the acute symptoms subside, cautious and gentle irrigation with a warm saturated solution of boric acid or a 1 per cent. saline solution may be tried, and if found not to cause pain it should be repeated once or twice a day.

If boric solution is used for the irrigation one of the organic silver preparations may be thrown into the bladder after the boric solution is evacuated. Two or 3 drams of 10 to 20 per cent. solution of argyrol, left in the bladder in this manner, acts with apparent benefit.

Great protraction of the symptoms and the continued presence of pus in the urine calls for the use of the cystoscope in

order to differentiate between persistent cystitis and lesions higher in the urinary tract. If areas of extreme redness or superficial ulceration are found in the bladder they should be touched with solutions of nitrate of silver applied to the inflamed patch only. The Kelly cystoscope should be utilized for this purpose as the application can be made by the direct aid of sight and with no risk of dropping the solution into the bladder. Even when done with the greatest care this procedure causes some pain, and the careless dropping of nitrate of silver solution into the bladder is so painful that it is likely to induce the patient to discontinue treatment.

Chronic Cystitis.—Chronic cystitis as a primary disease in women is not very common, most cases so diagnosed being recurrent acute cystitis, ureteritis, pyelitis, tuberculosis of the kidney and ureter as well as the bladder, benign or malignant growths in the bladder, or irritable bladder from the pressure of tumors or the dragging of adhesions. Interference with the blood and nerve supply of the bladder during the performance of hysterectomy seems to predispose to infection, and this infection may become chronic because of lowered resistance from the same source. The presence of a calculus or other foreign body in the bladder leads sooner or later to chronic cystitis, as does a vesico-vaginal fistula or an abscess which has opened into the bladder from the surrounding structures. There is a form of true chronic cystitis in which the bladder wall becomes thickened from inflammatory infiltration, the cavity of the viscus becoming progressively smaller as the inflammatory process progresses, but many of the symptoms which formerly were presumed to be due to chronic cystitis have been relegated to the same category by the urologist as have the symptoms of indigestion by the abdominal surgeon. The symptoms are present, but the lesion usually is elsewhere. One marked exception to this rule is the chronic cystitis which sometimes results from the decomposition of urine retained in the bladder of a patient who has an old cystocele. Even here it is

true that the cystitis is not primary, but it may need treatment after the causative lesion is removed.

The symptoms of chronic cystitis are pain, frequent urination and tenesmus, and the passage of small quantities of purulent, sometimes blood-stained, urine. Examination of the urine shows it to be cloudy, either acid or alkaline (always the latter if chronic retention is present), and microscopically the centrifugalized sediment shows pus cells, bladder epithelium, and sometimes blood. The infecting micro-organism, if other than the tubercle bacillus, is readily found.

The cystoscope should always be used in examining patients who present the cardinal symptoms of chronic cystitis unless the etiology is plain. By its use the inflamed portion of the mucous membrane can be seen, as well as ulcers, foreign bodies, and new growths.

Differential Diagnosis.—The process of differentiating chronic cystitis from other lesions which present the same subjective symptoms consists first, in ascertaining the actual condition of the bladder by inspection, and second, in eliminating the graver lesions higher in the urinary tract. Ulcerated areas, elsewhere than about the ureteral orifices, point to an uncomplicated bladder lesion, but an erosion which is confined to one ureteral orifice at once leads to suspicion of disease of the corresponding kidney. If coincidently the urine is acid and the quantity of pus small, while urination is frequent and the amount passed in 24 hours is above normal, the probability of tuberculosis of the kidney is so great that repeated search for the tubercle bacillus must be made. Failure to find the bacillus does not mean that one is on the wrong track until, or unless, animal inoculation also proves negative.

Pus or blood coming from one or both ureters stamps the case at once as something more serious than cystitis.

Painful frequent urination, without pus, blood, or micro-organisms, is a common complaint and means that there is no bladder infection, but foci of infection in the kidney may drain

intermittently and at the same time cause persistent bladder irritation, so that repeated negative findings are necessary to rule out a kidney lesion. Once this is accomplished the bladder symptoms may be classed as neurotic if there is no abnormal pressure upon the bladder or ureter.

Treatment.—The causative lesion must be given attention in every case of chronic cystitis. Cystocele should be corrected, abnormal openings into the bladder closed, and foreign bodies removed, before the bladder itself can be treated successfully.

Tuberculosis and abscess of the kidney should have surgical attention, after which the bladder tends to recover spontaneously.

For the cystitis itself both internal medication and local treatment are useful.

Hexamethylenamine internally up to 30 or 40 grains daily, if the urine is acid, probably has an inhibitory effect on the growth of micro-organisms in the urinary tract. If the urine is persistently ammoniacal, sodium or ammonium benzoate in doses of 10 grains three times daily is of service, as it is excreted as hippuric acid and thus helps to overcome the alkalinity of the urine.

As in acute cystitis, the greater the dilution of the urine the less irritating it is, and large quantities of water should be taken daily.

Also as in acute cystitis, the use of mild sedatives, such as belladonna and the bromides, overcomes the hypersensitiveness of the bladder and internal orifice of the urethra and lessens the frequency of urination, and in this manner indirectly assists in bringing about a cure by securing rest for the bladder wall.

The importance of the patient's general condition should not be overlooked when combating a chronic infection, and everything possible should be done to bring this up to the highest possible point. Vaccine treatment has been discussed in the section on gynæcologic therapeutics. It is still somewhat uncertain but should be tried if the infection is persistent.

It is upon local treatment, however, that the greatest dependence must be placed. Here bladder irrigations with the milder antiseptics, such as saturated boric acid solution, are of value, and the instillation of silver salts is indicated after the bladder is empty. Argyrol, even in solutions up to 15 or 20 per cent., is not irritating and should be used once or twice daily.

In obstinate cases direct applications of silver nitrate should be made to the bladder wall, using a 2 per cent. solution through the endoscope. This should be applied only to ulcers or deeply congested small areas and may be repeated once or twice a week.

Emulsions of orthoform are anæsthetic and relieve the pain, but they cannot be efficiently sterilized and their use adds the risk of a mixed infection.

Iodoform in sterilized olive oil may be injected once daily if tuberculous cystitis is present.

An ingenious method of applying medicaments upon the outside of rubber balloons, which are inflated after their insertion into the bladder, has been devised at the Johns Hopkins Hospital. This is especially useful in cases of true chronic cystitis with marked contraction of the bladder wall, but the treatment is too complicated for office use. If the case fails to respond to ordinary methods after prolonged treatment, temporary drainage through an opening in the vesico-vaginal septum is indicated as a last resort. The risk of mixed infection is not great because the bladder is always empty, neither does such an opening often eventuate in a permanent fistula, but either of these disagreeable sequels might happen and the possible consequences should be considered before drainage is instituted.

HEMORRHOIDS

One of the very common complications of gynæcologic disease is a more or less varicose condition of the hemorrhoidal veins which persists in a large percentage of women who have borne children.

Hemorrhoids are classified as external, internal, or mixed, according to whether they are situated in and beneath the skin surrounding the anus, above the white line joining the skin and mucous membrane, or whether they are a combination of both.

External hemorrhoids are either quiescent tabs of skin about the anus or thrombotic varicosities. The former are of little consequence although they may become inflamed and give rise to considerable annoyance.

The thrombotic external hemorrhoid, on the contrary, is one of the most exquisitely painful minor disorders imaginable, as the thrombotic process frequently extends upward so that the inflamed vein is caught in the grasp of the sphincter. Defecation, urination, every attempt to control expulsion of flatus, and even wholly involuntary contraction of the sphincter, pinches the inflamed vein and causes extreme pain.

Subcutaneous rupture of these veins is frequently produced by straining at stool and other efforts that invoke marked fixation of the abdominal muscles.

The diagnosis is easy, the thrombotic pile appearing at the anal margin as a small purple tumor which is exquisitely sensitive to the touch.

The treatment is simple and efficient if properly carried out under antiseptic precautions. A drop or two of 4 per cent cocaine solution is thrown into the tumor immediately beneath the skin, and the latter incised in a longitudinal direction. This incision relieves tension and the contained clot is spontaneously expelled. No squeezing or curetting should be done. The anus is at once covered with a hot weak bichloride compress and the same form of dressing should be continued until healing is complete, as infection of the small wound might prove to be a serious matter through extension upward along the thrombotic vein. The bowels should be kept open by mild laxatives but cathartics increase rather than diminish the discomfort.

Persons predisposed to external hemorrhoids may often forestall attacks by the absolute avoidance of straining at stool and

by sponging the anus with cold water instead of using toilet paper after defecation.

Internal Hemorrhoids.—Laying aside academic classifications, internal hemorrhoids can be divided into two forms. The common or venous hemorrhoid is composed of a bundle of varicose veins surrounded by considerable quantities of connective tissue. The nutrient artery enters and the veins leave the tumor at its superior aspect well above the skin margin.

Early in the history of this form of hemorrhoid there is considerable bleeding from the varicosities of which it is composed, but attacks of inflammation in and about the vein finally result in the deposit of more connective tissue and diminution of the vascularity, so that the bleeding may be greatly lessened or abolished.

The symptoms of which most complaint is made are the early bleeding, the attacks of inflammation which give rise to rather severe pain, and the presence of a protruding mass on defecation. The bleeding varies from a slight streaking of the bowel passage with blood, to hemorrhages so severe that a high grade of anæmia results. "An attack of piles" is the popular synonym for a phlebitis or other inflammatory process in the tumor, which causes both rectal and vesical tenesmus and a backache which extends down the posterior surface of the thighs. This subsides in a few days and leaves the affected hemorrhoid firmer and less vascular than before.

Some protrusion is usual with each act of defecation. If the sphincter muscles are not irritable the hemorrhoids are easily returned within the anus, but a tightly contracted or irritable sphincter may retain them within its grasp long enough to cause strangulation and sloughing, followed by a spontaneous, although long-drawn-out and painful cure.

Long duration of the disease leads to involvement of the veins external to the sphincter, when "mixed hemorrhoids" is the result.

Diagnosis.—The diagnosis is so easy that it is usually made by the patient, but all rectal affections unfortunately are presumed by the laity to be hemorrhoids, and on this account early carcinoma of the rectum is universally overlooked.

Every patient who complains of rectal symptoms should be carefully examined both digitally and with the speculum. The internal hemorrhoid is scarcely perceptible to the touch, but is visible when the anus is inverted by the finger in the vagina, and upon the introduction of a bivalve or trivalve rectal speculum it is seen as a bluish sessile tumor which bleeds upon rubbing its surface. As a rule there are a number of tumors about the circumference of the anus with strips of healthy mucosa between, in which prolapsed hemorrhoids differ from prolapse of the rectum. Cancer of the rectum is a distinct, hard, nodular or annular new growth, which ulcerates and does not prolapse.

Very intense pain, aside from strangulation of the hemorrhoidal tumors, is much more suggestive of anal fissure or ischio-rectal abscess than of hemorrhoids.

Treatment.—The treatment is either palliative or radical. Radical treatment is positively indicated for strangulated hemorrhoids and for those which bleed so freely as to cause a severe grade of anæmia. All others must be treated radically if cure is desired, but the annoyance so frequently is trifling that the patient is unwilling to undergo operation. Under such circumstances much can be done to alleviate the discomfort by keeping the bowels open, by absolute avoidance of straining a stool, and the use of cold-water enemas and the cold spray; a practical combination of these being obtained by the use of a small dose of cascara at night, a small enema of cold water in the morning with immediate cessation of efforts at defecation when the lower bowel is emptied, the immediate replacement of the tumors, and a cold douche to the anus before leaving the toilet. Mild astringents, such as the distilled extract of hamamelis, applied to the protruding tumors on a pledget of cotton before replacing them also seem to be of some

benefit, but the very fussy applications of salves and suppositories are hardly worth the time and trouble required for their use.

Surgical Treatment.—The office treatment of hemorrhoids by means of hypodermic injections into their interior should be left to the rectal specialist, who on the grounds of a large experience may be able to defend himself when disaster overtakes him. The gynæcologist and surgeon had better confine himself either to palliation or outspoken operative measures.

Pre-operative treatment should include a cathartic 24 hours, and an enema four or five hours, before operation. The enema should be entirely removed, even if the use of the rectal tube is necessary for this purpose. The diet for the preceding day should be restricted to such cooked food as leaves but little residue. Cleansing and shaving should be performed the night before. The final cleansing should be performed with soap and water, washing this off with sterile water followed by alcohol, and should take place after the patient is anæsthetized. As the operation frequently is performed in association with plastic work, general anæsthesia will have been required for that purpose, and in all but the simplest cases it is more satisfactory even when hemorrhoidectomy is done alone.

A word of caution concerning the combination of abdominal and rectal operations may not be out of place. Should there be any difficulty in opening the bowels after a laparotomy, the matter of a sensitive painful rectum is not only annoying but under some circumstances becomes an actual source of danger by preventing the effectual use of enemas.

With the patient in the lithotomy position the anus is slowly but thoroughly dilated, paralysis of the sphincters, but not their rupture, being the aim. This may be accomplished with the speculum or fingers, preferably the latter as they more accurately register the degree of resistance remaining. After thorough dilation has been accomplished the hemorrhoids prolapse spontaneously or can readily be drawn outside the anus.

A great variety of methods has been suggested for their removal—simple crushing, ligature, the clamp and cautery, complete excision with ligature of the vessels and repair of the defect, and complete removal of the pile-bearing area.

The only one of them to be positively avoided is excision and suture, since the rectum is, and always remains, a contaminated area, and with a number of completely sutured wounds in such an area some must become infected. Complete re-



FIG. 234.—Hemorrhoidectomy. "After thorough dilatation the hemorrhoids prolapse spontaneously."

moval of the pile-bearing area is a severe operation and should be reserved for the worst type of cases.

On the whole, the clamp and cautery is the more satisfactory from the standpoint of simplicity and the after-pain is not so severe as from the ligature method.

Each tumor is picked up individually, its muco-cutaneous margin incised, and the clamp so applied that if all were applied simultaneously their points would meet in the center of the

anus. Unless a non-heat-conducting clamp is at hand the skin behind the clamp should be protected by moist sponges. The hemorrhoid is then removed a short distance beyond the clamp and the protruding stump charred with the cautery at a dull red heat. The clamp is opened slowly and if hæmostasis is not perfect the oozing point is again touched with the cautery.



FIG. 235.—Hemorrhoidectomy. "Each tumor is picked up individually and its mucocutaneous border incised."

A simpler and better method is to burn away all the protruding tumor after preliminary incision of the muco-cutaneous border and clamping.

In the absence of a good cautery a simple ligature method consists in first drawing down the tumor and snipping through the muco-cutaneous junction; the pile is then clamped by one or two hæmostats applied well against its base and in the

longitudinal axis of the body. A heavy thread is passed behind the clamps so as to perforate the pile base at its middle and this thread is tied in both directions, the tying being done as the clamp is removed so that the ligature lies in the groove produced by the instrument. If the tumor is very small nothing more need be done; if larger it should be cut away sufficiently far from the

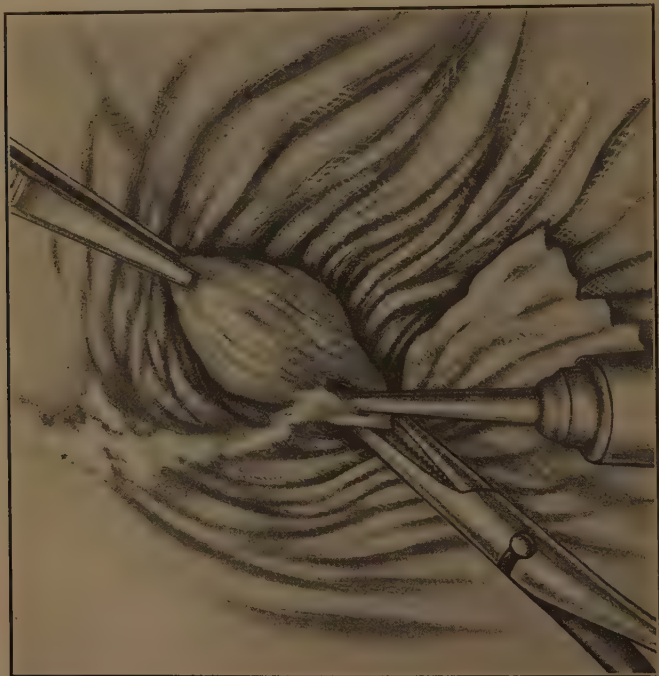


FIG. 236.—Hemorrhoidectomy. The skin is protected by moist sponges. The pile is crushed at its base after incision of the mucocutaneous border. The entire tumor is removed by the cautery.

ligature to avoid any danger of the latter slipping off the stump. All the tumors can be removed by either method, providing they are all clamped longitudinally and a strip of normal mucosa is left between the adjacent stumps.

When the operation is completed the anus should be gently held open to make certain that active bleeding has been con-

trolled; and a strip of iodoform gauze is introduced above the site of operation with its outer end protruding through the anus. This gives immediate warning of post-operative bleeding and keeps the stumps apart.

The post-operative treatment consists in the use of enough morphine hypodermically to prevent extreme pain and spasm

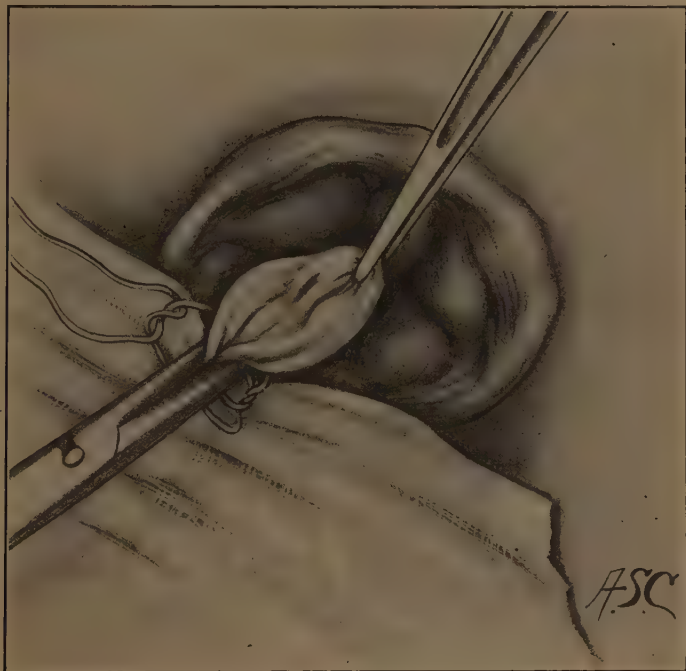


FIG. 237.—Hemorrhoidectomy. Clamp so applied that it points toward the center of the anus.

of the sphincters should their paralysis not be complete. Catheterization is frequently necessary but should be avoided if possible.

After the lapse of 48 hours a saline cathartic or a half ounce of castor oil is given. When the patient feels that the bowels are about to act, an enema of sterile oil is administered through

a soft catheter which is introduced beside the gauze, and the latter is expelled with the bowel motion. The *anus* is irrigated externally with sterile water, boric acid solution, or a weak bichloride solution after each defecation.

There is sometimes extreme swelling within a few hours after operation, this being proportionate to the force used in dilating.

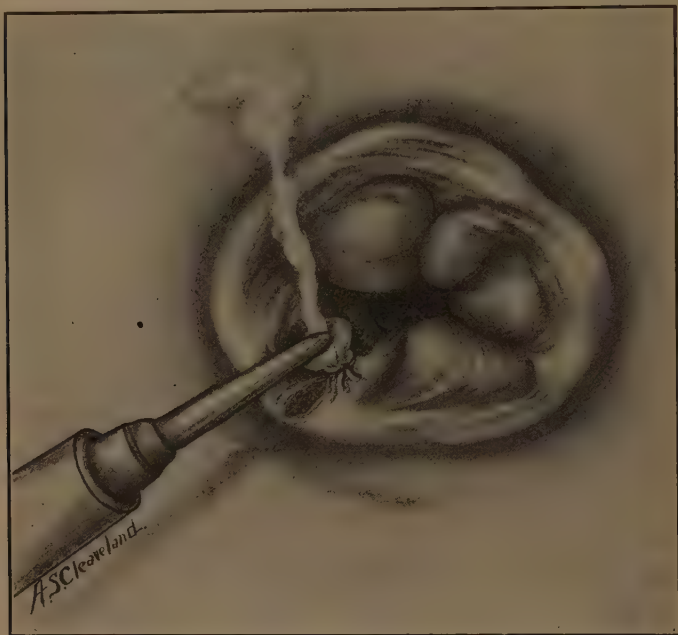


FIG. 238.—Hemorrhoidectomy. It is wise to char the end of the stump with the cautery after the ligature operation.

The discomfort so caused may be markedly alleviated by hot moist dressings of normal saline or weak bichloride solution.

The bowels should be opened daily after the first motion and the oil enema may be repeated whenever necessary.

The diet, at first liquid, is gradually increased, but the pain on defecation is materially lessened if the diet is somewhat restricted until healing is well advanced.

The patient is kept in bed until perfectly comfortable, and

should remain under observation at least 10 days, as late bleeding occasionally occurs after any method of operation. While this usually is not dangerous, it is alarming, and it is far better to have the patient under direct observation a day or two longer than necessary rather than have her disturbed by a hemorrhage after professional care has ceased.

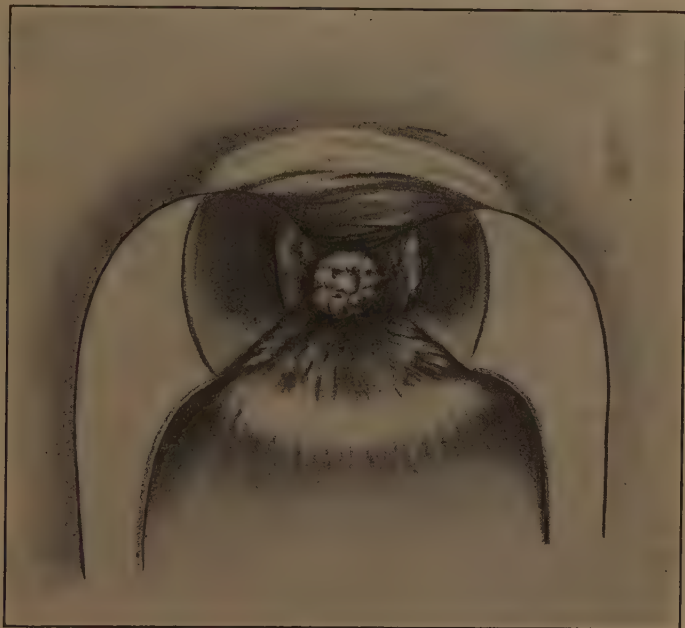


FIG. 239.—The raspberry-like or capillary internal hemorrhoid.

The other form of internal hemorrhoid is a small raspberry-like growth occurring somewhat above the level of the internal sphincter. Its only symptom is hemorrhage, the quantity of blood lost being surprising when the size of the growth is considered. It sometimes requires prolonged search to locate this capillary pile, but it always can be found if the knee-chest posture is assumed by the patient while the short proctoscope is used by the examiner. When found it may be clamped and tied off

or destroyed by the thermo-cautery, no especial after-treatment being required.

APPENDICITIS

Both acute and chronic appendicitis are frequently observed by the gynæcologist. The former is often mistaken for acute infection of the pelvic organs and *vice versa*.

Chronic appendicitis may produce distinct pelvic symptoms when the cæcum is prolapsed, and the retroverted uterus is frequently the cause of pain in the right iliac fossa.

Acute Appendicitis.—Acute appendicitis is typically a disease of the second and third decades, but no age is exempt from infancy to senescence.

Its etiology is not always clear, but the frequency with which concretions, strictures, kinks, and bends are found, leads one to regard mechanical insult and imperfect drainage as the common provoking factors, in an organ whose blood supply is limited and whose resistance is undoubtedly lowered thereby, as well as by its instability as a vestigial structure.

The constant presence of colon bacilli in the lumen of the appendix provides the only micro-organism necessary, but staphylococci, streptococci, and the bacillus pyocyaneus are many times associated with it. Attention has recently been called to the possibility that anærobic bacteria, not growing on ordinary culture media, may be responsible for some rather mysterious infections of portions of the intestinal tract.

Pathology.—The pathological conditions found vary widely. In the mildest cases there may be only a diffuse inflammation of the mucous membrane with ecchymotic spots scattered through it, some œdema of the entire organ, and a little injection of its peritoneal covering.

In other instances there may be occlusion of the appendix with inflammation of that portion distal to the stricture and suppuration, the pus being confined to the interior of the occluded portion. In still others, gangrene, which is limited to

the mucosa of a small area results in an ulcer which may extend through the mucosa, or through all the coats and produce a perforation. Occasionally one finds a very minute ulcer in the appendix of a patient whose symptoms have been so marked that the relationship existing between the lesion and the symptoms seems distinctly out of proportion. An analogous condition is sometimes found in the urethra of male patients who have "urethral fever" after the passage of a sound or catheter.

Total gangrene of the appendix is sometimes seen, the whole organ presenting the appearance of a sloughing piece of



FIG. 240.—Acute appendicitis. Appendix occluded near coecum at point clamped. Entire appendix distal to this point distended with pus.

tissue, and partial gangrene is very common. The limited blood supply to the appendix explains the early and frequent occurrence of gangrene when the circulation is interfered with by thrombosis of the artery of the meso-appendix or any of its branches.

Perforation and gangrene lead inevitably to peritoneal infection, but this also may occur from migration of microorganisms through the intact but inflamed wall of the appendix.

Slow perforation, gangrene of small areas, and infection through the intact wall, cause limited peritoneal involvement

because adhesions form ahead of the lesion. Sudden and complete perforation, and total gangrene, lead to wide contamination of the peritoneal cavity with subsequent inflammation, the pouring out of large quantities of peritoneal serum, general peritonitis, and widespread suppuration.

Localized abscess formation also is frequent if appendicular infection lasts more than 48 hours. In most cases the abscess

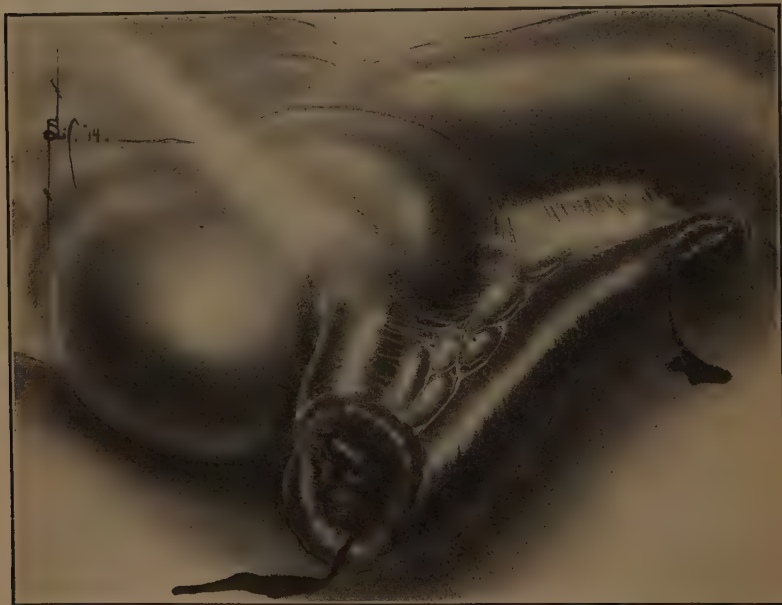


FIG. 241.—Drawing from specimen of early gangrene of the appendix with two perforations.

contains the appendix, either in its cavity or forming a portion of its wall. A localized abscess may be residual and follow peritonitis when it may be some distance from the original source of infection, or it may be a gravitation abscess produced by the gradual accumulation of products of inflammation at the bottom of the pelvic cavity.

It is by no means rare to find a normal-appearing appendix

in or about an old abscess, the appendix itself having undergone complete resolution while pus continued to accumulate around it.

The character of the wall surrounding an appendicular abscess differs according to its location. It may be composed entirely of intestine and inflammatory exudate, or intestine and exudate may lie to the median side with parietal peritoneum laterally. When the appendix is retro-peritoneal, the posterior surface of the cæcum and ascending colon form the anterior abscess wall, the lateral walls being bounded by the peritoneum as it leaves the colon.

A gangrenous area upon the cæcum or other portion of the intestine is not uncommon, and should the patient live sufficiently long this becomes a perforation through which the abscess will open. Enlarged mesenteric glands are frequently found both in the meso-appendix and the retro-colic chain.

Symptoms.—Pain is the first symptom of acute appendicitis, and it is present throughout the entire course of the disease excepting during the first few hours after total gangrene of the organ.

The early pain, almost without exception, is referred either to the epigastric or para-umbilical region. The early pain is likely to be more severe than that which is present later unless widespread virulent peritonitis results, and its reference to the epigastric and umbilical regions, as well as its severity, leads one to believe that it is due to a true appendicular colic from distension of the appendix rather than the inflammatory process itself. After the lapse of a few hours the pain becomes localized in the right iliac fossa, its point of greatest intensity more often being at McBurney's point than any other one place. However, this latter pain which is distinctly inflammatory in origin, may be to the left of the median line, low in the pelvis, near the inguinal ligament, in the right renal region, or at the costal margin anteriorly. The early pain is intermittent, or more precisely remittent, while the later pain is

constant in its character. Acute exacerbations of pain after the first day or two are chiefly due to the spread of the infection from its original source.

Nausea and Vomiting.—Reflex nausea and vomiting, while not so constant as pain, are nevertheless almost universally present. Sometimes there is but one attack of vomiting which comes on soon after the onset of pain and does not recur, unless, or until, peritonitis becomes a marked feature of the disease. The vomited material consists of the stomach contents, and it is this which leads to the almost universal diagnosis of "acute indigestion" at the outset of an acute attack of appendicitis. A chill is rarely observed at any time during the course of the disease. It is of no especial importance when it does occur, unless it be to awaken the patient and her physician to the fact that something really serious is taking place.

Fever is rarely absent after the first few hours, but as a rule with few exceptions it does not come on until after both pain and vomiting have occurred, a fact whose significance was pointed out by Murphy. Several facts regarding the temperature in appendicitis need emphasizing, the first being that mouth temperature is always unreliable because the dry tongue interferes with the correct action of the thermometer, and thirst leads to the constant drinking of cold water which changes the temperature of the mouth for the time being. The temperature, therefore, always should be taken per rectum. The second is that the degree of fever bears no known relation to the severity of the disease. Many a patient with appendicitis has gone to an untimely grave because the temperature was not alarmingly high. A high temperature may persist for a day or two followed by complete recovery, while only a trifling elevation may be present in a fatal attack. The pulse usually corresponds somewhat to the degree of fever present, but in virulent cases the temperature may be but slightly elevated while the pulse is almost uncountable. The rate and character of the pulse are far less likely to be misleading than the temperature.

Constipation is the rule at the outset although an occasional attack begins with diarrhea.

Bladder irritation may be complained of when the cæcum and appendix are so prolapsed that adhesions to the bladder form or infection of its peritoneal coat occurs.

The leucocyte count is increased in all but the most virulent attacks. While the relationship between leucocytosis and the severity of infection is no more constant here than elsewhere, it does provide a rough basis for estimating the latter, a leucocyte count as low as 12 or 15 thousand rarely being present with gangrene or free perforation, while one of more than 30 thousand always calls attention to the possibility of pulmonary complications.

On physical examination some tympany is usually found after peritoneal involvement has taken place, but this is not constant in the early hours.

Tenderness upon pressure, likewise, always is present when the peritoneum is involved and usually before this time, but a pelvic appendix may escape pressure applied through the anterior abdominal wall. Pain in the right iliac fossa is often elicited by pressure on the other side of the abdomen, and pain upon sudden withdrawal of the examining hand is usually more severe than that caused by pressure.

Hyperæsthesia of the skin and rigidity of the abdominal muscles to the right of the mid-line, more especially rigidity, are among the most important diagnostic signs, and their significance is due to the fact that no matter where the appendix may lie its nerve supply is always the same; consequently the muscular rigidity (before involvement of the parietal peritoneum) is always in the same place. Rigidity corresponds more nearly to the area about McBurney's point than does pain or *deep* tenderness to pressure.

Rigidity which is most marked halfway between the umbilicus and anterior-superior spine, which shades off imperceptibly at the costal margin superiorly, at the left rectus laterally, and

above the pubes inferiorly, is rarely due to anything but appendicitis.

On percussion during the first hours of appendicitis no appreciable change may be found; later more marked tympany may be made out over the abdomen generally, and local dullness may possibly be present in the right side. Even over an abscess there may be a marked tympanitic note from the presence of gas within its cavity.



FIG. 242.—An appendicular abscess may give a tympanitic note on percussion from the formation of gas due to the activities of the colon bacillus.

A distinct palpable mass can be found in the right iliac fossa if local peritonitis about an infected appendix has existed for many hours, but the palpable mass is a late, not an early development, and means that peritoneal exudate has been poured out in appreciable quantities, and that sufficient time has elapsed for solidification of the exudate and matting together of the viscera.

On vaginal examination the mobility of the uterus is not lessened in the early stages, but the frequent association of pelvic peritonitis and gravitation abscess with appendicitis, may fix the uterus later in the disease. Appreciable swelling is rarely found in the early stages although a mass may appear later, either upon the right side or in the recto-uterine excavation. Rectal examination in women ordinarily only confirms the vaginal findings, and while it should not be neglected it throws no new light upon the diagnosis.

Clinical Course and Progress of Acute Appendicitis.—There is no typical or even average course pursued by appendicitis, the attacks varying from the very mildest which last only a day or two, to those of extreme severity, with gangrene, rapid widespreading peritonitis, and death within a few days.

It is altogether probable that mild attacks are much more common than we have suspected, and this is especially true in children whose attacks of “acute indigestion” are often attacks of appendicitis of a mild character.

The mildest cases of acute appendicitis may present symptoms which last but a few hours. There is some pain, one or two vomiting spells, and a trivial elevation of temperature, but the palpatory findings are entirely negative excepting as regards rigidity.

Other cases, with a slowly forming perforation or infection through the intact wall of the appendix, develop more severe symptoms, and there is evidence of localized peritonitis with the evolution of a palpable mass which may undergo complete resolution or in which an abscess may develop.

Even with the development of an abscess, recovery is still possible without surgical interference through perforation into the intestine and spontaneous drainage.

Gangrene of the whole organ or wide open large perforation may cause general peritonitis and death. Inflamed retro-cecal appendices very often lead to secondary involvement of the

lung, to pyelo-phlebitis, and to sub-phrenic abscess, all of which are desperate and frequently fatal complications.

On the whole, the exact mortality rate of acute appendicitis is unknown. There is no justification for the belief of many surgeons that most cases would die if not operated upon, but there is less justification for a waiting policy, which condemns many to recurring attacks, fecal fistulæ, and prolonged convalescence. There is no surgical disease in which the symptoms and physical signs convey so little knowledge of the ultimate outcome as acute appendicitis, those cases which seem to be very mild often terminating disastrously, and those with the severest possible onset recovering in a surprisingly short time.

Diagnosis.—Acute appendicitis is so common that virtually every known disease which causes acute abdominal pain and fever has been mistaken for it at one time or another. Practically, in every patient presenting the above symptoms one must think of the following: pleurisy, pneumonia, gastro-enteritis, ileo-colitis, intestinal obstruction, cholecystitis, cholelithiasis, tubal pregnancy, salpingitis, oophoritis, torsion of the pedicle of an ovarian tumor, Dietl's crisis, and renal calculus.

Both pleurisy and pneumonia are, in young subjects, frequently accompanied by abdominal pain, vomiting, and tympany, and both may present cutaneous abdominal hyperæsthesia and some rigidity.

In pleurisy the friction rub is so perceptible as not to be overlooked *if examined for*. Central pneumonia may be present in children with no demonstrable physical evidences in the chest, but the rapid respiration of pneumonia and its disturbed pulse-respiration ratio has no counterpart in acute appendicitis. A leucocyte count of upward of 30 thousand should always lead to a suspicion of pneumonia.

Ileo-colitis in young children is so much more frequent than appendicitis that the latter many times is overlooked.

Diarrhea, especially if the bowel passages are blood-stained, should lead one to suspect ileo-colitis or intussusception.

Vomiting preceding the onset of pain is suggestive of gastro-enteritis rather than appendicitis, and fever preceding either vomiting or pain, while it does not exclude appendicitis, puts it out of the range of probability.

In many cases of acute gastro-enteritis, colitis, etc., the abdomen is tympanitic, but *it is not rigid*.

In any case of suspected appendicitis in which pneumonia, gastritis, enteritis, or colitis cannot be excluded, it is much wiser to make a tentative diagnosis only, since delay for a few hours is rarely dangerous in appendicitis, while an operation which reveals a normal appendix, in a patient who has pneumonia, is nothing less than a catastrophe.

Intestinal obstruction is frequently mistaken for appendicitis. As both are surgical conditions a mistake is fraught with no danger to the patient if the operator is competent to deal with either. *Violent* peristalsis is never present in appendicitis. On the contrary, while gurgling may be appreciable, peristalsis is less than normal. The material vomited in uncomplicated appendicitis is not intestinal, and enemas are effectual in causing the expulsion of flatus.

The pelvic disorders which simulate appendicitis have been discussed under their appropriate heads. Their exclusion is sometimes impossible but an attempt should always be made to establish a positive diagnosis. Any error in diagnosis should be in favor of appendicitis and operation, as it is only in salpingo-oophoritis that operation during the acute stage is not advisable.

Lesions of the kidney and ureter always need consideration. The kinked pedicle of a ptosed kidney, or the obstruction produced by a calculus in the right ureter, may cause right-sided abdominal pain, vomiting, and fever, and the pain comes *first* as in appendicitis. Bladder tenesmus may be present both in appendicitis and kidney lesions, but is less marked in the former. Bloody urine is very rare in acute appendicitis, and the *sudden* development of a tumor points strongly to acute hydronephrosis rather than appendicitis.

In doubtful cases the X-ray should be used in order to exclude kidney lesions. While those mentioned are surgical disorders it is a blunder to operate upon them during the acute stage, and a mistake may necessitate two incisions and a prolonged operation instead of the simple appendectomy, which the patient was promised.

Gall-bladder disease usually gives rise to more severe pain than appendicitis, the pain is higher in the abdomen, rigidity is marked just below the ninth costal cartilage and lessens as one palpates toward the region of the appendix. A chill is far more common in cholelithiasis and the temperature may fluctuate widely within a few hours. In cholelithiasis without pus leucocytosis is not at all marked, but a suppurating or gangrenous gall-bladder is productive of leucocytosis as is appendicitis. While the age, physique, and history of the patient may present nothing decisive, they still have their weight in determining the preponderance of evidence. Gall-bladder disease is common in stout women who have borne many children, while neither of these has any apparent effect upon the incidence of appendicitis.

Treatment.—There is but one proper treatment for appendicitis in its early stages, and that is operation. One operates, not because all the patients would die if unoperated, but because it is impossible to determine which one will. Skillful operation within 48 hours of the onset will save practically every patient, and it may be said with but little exaggeration that if an occasional one dies at this time, that one was doomed from the outset. Early operation is practically without danger; there is no late abscess formation, no widespread infection, no septic pneumonia, no fecal fistula, no secondary operation, and no recurrence.

Again, there is no dispute regarding the propriety of operation after a localized abscess has formed, whether in the right iliac fossa; behind the cæcum, or in the pelvis. That the abscess should be opened is undoubted. The advisability of operating during the stage of diffuse peritonitis has been seriously ques-

tioned by Ochsner and others, who prefer to treat the disease medically at this stage and await what is considered to be the more favorable time, that of well-walled-off abscess formation.

The author has never seen a case in which it did not seem that the earlier surgical intervention was practised the better, excepting only those in whom the peritonitis was so severe or toxæmia so profound that anæsthesia was dangerous. This is usually revealed by a quiet universally distended belly, the intestinal coils sometimes showing plainly beneath the abdominal wall, a rapid thready pulse, leaky skin, and cyanosed extremities. Here the trifling shock of anæsthesia and even a short operation might destroy the only possible hope of recovery.

With this exception, the best rule to follow is to operate at once upon any case which is severe enough to be positively diagnosed. This does not mean hurried hasty operation with lack of skilled assistance and with improper technique, nor does it mean that a bungling operation is better than no operation, for such is not the case. Sufficient time can always be taken to make the diagnosis reasonably sure, to secure a skilled surgeon, to send the patient to a well-equipped hospital if in the city or adequately prepare for operation in the country. If these things cannot be done the patient is safer under medical treatment.

It has been denied that there is any medical treatment for acute appendicitis. While it is true that drugs, aside from opium, are of no value, the general management of a patient until such time as operation can be performed in an operative case, or throughout the disease if operation is rejected, or during the stage of acute toxæmia, is of great importance.

The cardinal principles of such treatment are:

1. Rest in bed. Diffusion of infection may follow moving about.
2. The avoidance of narcotics until the diagnosis is made.

Afterward they do no harm in the small amounts needed to relieve pain and quiet peristalsis.

3. Avoid purgation. There is absolutely no virtue in purgation excepting that it empties the bowel, and this can be accomplished with enemas. Only too often purgation empties the bowel *into the abdominal cavity* through a wide open perforation of the appendix, or a cæcum from which the appendix has sloughed. When an abscess has formed, purgation may rupture its wall and scatter pus widely through the abdominal cavity, and in the earliest stages of peritoneal involvement, violent peristalsis disseminates infection by dragging the small intestine from one part of the abdomen to another.

Very often the apparent improvement, which has manifested itself immediately after the cathartic has acted, is succeeded in a few hours by an exacerbation of pain, tympany, and fever. If this is met by another dose of calomel and salts, and the purging is repeated with every exacerbation, it is not surprising that the patient finally succumbs.

4. Keep the stomach free from food. Food does not digest under these circumstances and its ingestion stimulates intestinal peristalsis. Cold water also stimulates peristalsis but hot has less effect. The use of the stomach tube and entire abstinence from water and food, as advocated by Ochsner, is impossible of accomplishment outside of a well-disciplined hospital, but abstinence from food is the most important feature of this régime and can usually be brought about if hot water in small amounts is allowed frequently.

5. Keep down painful distension of the colon by the use of the rectal tube, daily enemas, or colon lavage if paralytic ileus threatens. Whether local applications to the abdomen have any influence over the course of the disease is open to some question, but that they relieve pain is undoubted. An ice-bag over the right iliac fossa sometimes renders the use of opiates unnecessary, and it should be avoided before a diagnosis is made, for the same reason, and used after diagnosis, also for the

same reason. Poultices agree better with some patients, but they are mussy and disagreeable and the same effect can be obtained by the use of flannel wrung out of hot water and kept hot with the hot-water bag or electric pad.

Such are the palliative measures which will assist nature to battle successfully with the disease when surgery is deferred or declined.

CHRONIC APPENDICITIS

The term chronic appendicitis is used in a very loose fashion and, as popularly understood, covers not only true hyperplasia



FIG. 243.—Chronic obliterative appendicitis.



FIG. 244.—Chronic appendicitis. Obliteration of distal extremity.

of the connective tissue of the appendix with gradual contraction and obliteration of its lumen, but also adhesions resulting from previous acute attacks, defective drainage due to kinks and strictures, appendicular colic from concretions, and mild recurrent attacks of acute infection.

It is decidedly doubtful whether the first of these, which is the only one that may be considered as a distinct pathological entity, is ever responsible for symptoms. Morris of New York has attempted to prove for it a distinctive sort of pain, but many

of his admirers have been unable to distinguish anything characteristic, and as often as not one stumbles on one of these appendices when operating for other lesions, without a single symptom having called attention to the appendix.

The etiology of the other conditions, as well as their pathology, is sufficiently suggested by their description. It is doubtful whether they can be correctly termed chronic appendicitis at all, and it seems more likely that the symptoms complained of are



FIG. 245.—Chronic appendicitis with communicating mesenteric cyst.

due to a low-grade recurrent acute infection. Clinically, however, their course is chronic and they must be so described in order to be understandable.

Chronic tuberculous appendicitis may be "sui generis" an appendicular lesion, or it may be secondary to tuberculosis of the tubes, or a part of a general tuberculous peritonitis; when tuberculous appendicitis exists as an independent lesion the diagnosis of chronic appendicitis is likely to be made without any definite idea as to the causative micro-organism. When associated with tuberculosis of the pelvic organs or with general

tuberculous peritonitis, the condition of the appendix is of minor interest save from the standpoint of its etiological relationship to the more widespread disease. There are clinicians of good repute who feel that tuberculous peritonitis is more likely to have originated in the appendix or tubes than in any other abdominal structures.

Symptoms.—Pain about the umbilicus and in the epigastrium is the symptom which most frequently sends the patient to the physician. Intractable so-called dyspepsia or indigestion, which really consists of epigastric distress and belching of gas

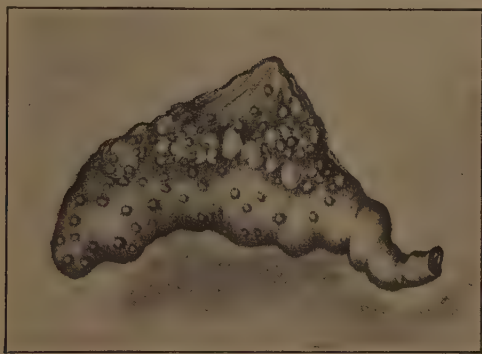


FIG. 246.—Chronic appendicitis. Tubercles on peritoneal surface.

after the taking of food, is much more frequent than pain referred to the right iliac fossa.

It is open to question whether this epigastric pain is due to any actual occurrence in the epigastrium, but there is at least a probability that it is caused by pyloric spasm.

Occasionally there is vomiting some hours after taking food.

Constipation is more frequent than diarrhea, but this is true in individuals who are otherwise well.

Patients with low grade but persistent infection of the appendix often complain of a feeling of weakness or malaise, which may be attributable either to the ever present or frequently recurring discomfort and the anxiety to which its unknown origin

gives rise, or to a constant toxæmia arising from the infection.

The temperature is normal unless taken during one of the exacerbations when it may be found a trifle elevated. The pulse is normal, sometimes slow if there is a coincident chronic infection of the bile tract.

In all forms of chronic appendicitis excepting the tuberculous the leucocyte count is quite persistently a trifle above normal, the differential count showing no deviation from the ordinary. Palpation of the abdomen may reveal no sensitiveness if the appendix is retro-cecal or pelvic, but as a rule a hypersensitive point is made out halfway between the umbilicus and anterior-superior iliac spine. Comparison should always be made between the right and left sides as the abdominal wall of some patients is always hypersensitive, and the patient herself may be unduly open to the suggestion of pain. Deep pressure with the ends of the fingers will elicit evidence of discomfort in any but the most phlegmatic normal individual, so that something more than a normal reaction to pressure is needed to establish the fact of a hypersensitive area.

Protective abdominal rigidity over the right side is usually found, although it may be so trifling as to be overlooked unless carefully sought.

Diagnosis.—Protracted symptoms of chronic appendicitis with a localized mass on deep palpation should lead to a suspicion that the appendicular infection is tuberculous in its nature. If every acute disease producing abdominal pain and fever has been mistaken for acute appendicitis, then it is likewise true that every persistent pain in the abdomen has been diagnosed as chronic appendicitis, and conversely chronic appendicitis has been called everything from "ovarian disease" to dyspepsia.

Retroversion of the pelvic disorders, floating kidney, mucous colitis and peri-colitis of the abdominal diseases, need the most attention. Retroversion and lesions of the right tube and ovary are readily excluded if a careful examination is made.

Floating kidney is easily found if examined for with the patient lying well over on the opposite side. Mucous colitis is revealed by the colicky pain, which is followed by the expulsion of large quantities of mucus, and peri-colitis is suggested by a palpable cæcum that hardens under the hand, and from which gas is expelled with a gurgling sound.

The presence of any of these disorders does not exclude appendicitis as it may co-exist with any or all of them. Other conditions, such as ptosis of the cæcum with pelvic adhesions, ureteritis and ureteral calculus, cholelithiasis, etc., must be considered, but on the whole the diagnosis of chronic appendicitis is most conclusively made by ruling out pelvic disease, floating kidney, and mucous colitis, and having remaining a history of chronic "dyspepsia," epigastric discomfort, and tenderness and rigidity in the right iliac fossa. Spontaneous pain in the right iliac fossa alone, not referred either to the epigastrium or umbilical region, is more frequently than otherwise *not* due to chronic appendicitis.

An occasional error in diagnosis is inevitable and must be met at the operating table, but errors in diagnosis are infrequent in proportion to the care taken in examination.

Treatment.—In distinction from acute appendicitis there is no medical treatment for the chronic type. Strictures cannot be overcome, concretions removed, adhesions absorbed, or connective-tissue contractions prevented, by any known drug. The most that can be done is to insure that the bowels are in good order, and that attacks of true acute indigestion and diarrhea do not cause sudden swelling with complete obstruction of the lumen of the appendix.

Persistent symptoms due to chronic appendicitis can be overcome only by the removal of the appendix.

APPENDECTOMY

The location and character of the incision to be made will depend upon the judgment of the operator.

If pelvic work must be done at the same time, the median incision or one low in the right rectus had best be chosen, as through it any appendix can be removed which is not retro-cecal or densely adherent high in the right iliac fossa.

For other cases four methods of entering the abdominal cavity are available: the muscle-splitting operation popularized by McBurney; an incision through the aponeurosis just outside of and parallel to the right rectus; the trap-door incision through



FIG. 247.—Four incisions for operations upon the appendix.

the right rectus fascia, drawing the muscle medianward after incising the anterior layer of the rectus sheath and incising the posterior sheath directly underneath the anterior incision; and the oblique incision between the margin of the rectus and anterior-superior iliac spine. The button-hole incision has no place in modern surgery which appreciates that a patient who submits to anæsthesia and operation is entitled

to an exploration of neighboring organs and the relief of any surgical condition present, even if previously undiagnosed.

The incision, no matter which one is chosen, should be adequate or capable of enlargement without undue mutilation.

In early first attacks of acute appendicitis when the appendix is positively intra-peritoneal the muscle-splitting incision is satisfactory, as it also is in chronic appendicitis with no suspicion of gall-bladder infection. It cannot, however, be satisfactorily enlarged to meet emergencies without cutting the muscle transversely at some point.

The trap-door incision is suitable for any case which will not need drainage through the incision.

The incision just outside of and parallel to the rectus meets

all the indications at all times, but does not permit of as satisfactory closure as the first two.

The oblique incision directly through all the muscles gives rise to hernia when free drainage is necessary, but occasionally it must be used in order to adequately expose an appendicular abscess which is external to or behind the cæcum.

Locating the Appendix.—In chronic appendicitis, and in early acute cases, the small intestine and omentum should be pushed toward the median line and kept there by a sponge if they tend to protrude. The coil of intestine most posteriorly and to the right is always the cæcum and ascending colon. In picking this up its anterior longitudinal band is followed to the base of the cæcum, thus exposing the ileo-cecal junction. No matter where the tip of the appendix may be, its base is definitely found at the inferior end of the anterior longitudinal band, and the base of the cæcum is positively reached just inferior to the ileo-cecal junction. The body and tip of the appendix may lie

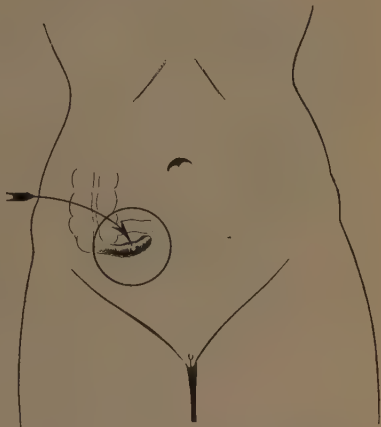


FIG. 248.—Most common location of the appendix but, "no matter where the tip of the appendix, its base is definitely found at the inferior end of the anterior longitudinal band."

anywhere within a circle whose radius is the length of the appendix, and whose center is the appendico-cecal junction, but having found the latter the appendix can always be traced, even if completely buried beneath adhesions or behind the cæcum. The appendix always is present unless it has been removed by a previous operation.

In very early acute cases, and in chronic appendicitis, the adhesions about the appendix are separated and its mesentery demonstrated, the appendix being drawn from the abdominal

cavity and completely outside the incision if possible. Occasionally the organ is so densely bound down that intestinal injury is to be feared if an attempt is made to release it by the separation of the adhesions which surround it. In such cases the cecal junction is found, the peritoneum over the base of the

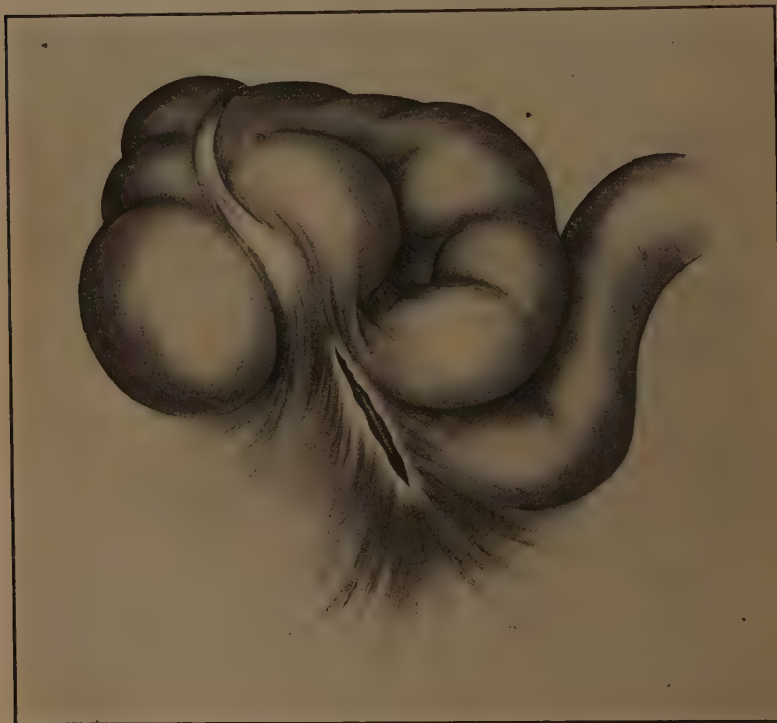


FIG. 249.—Appendectomy. The appendix buried. The peritoneum over the appendix is split longitudinally.

appendix split longitudinally, and the muscular coat separated from the peritoneal by blunt dissection around its entire circumference. Slight traction on the exposed portion, while blunt dissection continues toward its tip, brings out the entire appendix minus its peritoneal coat. In this event no mesenteric

ligature is needed, a stitch or two in the separated peritoneal shell controlling the bleeding.

In cases of acute appendicitis which have lasted sufficiently long to provoke many adhesions, or in which perforation and abscess have developed, the preliminary walling off of the

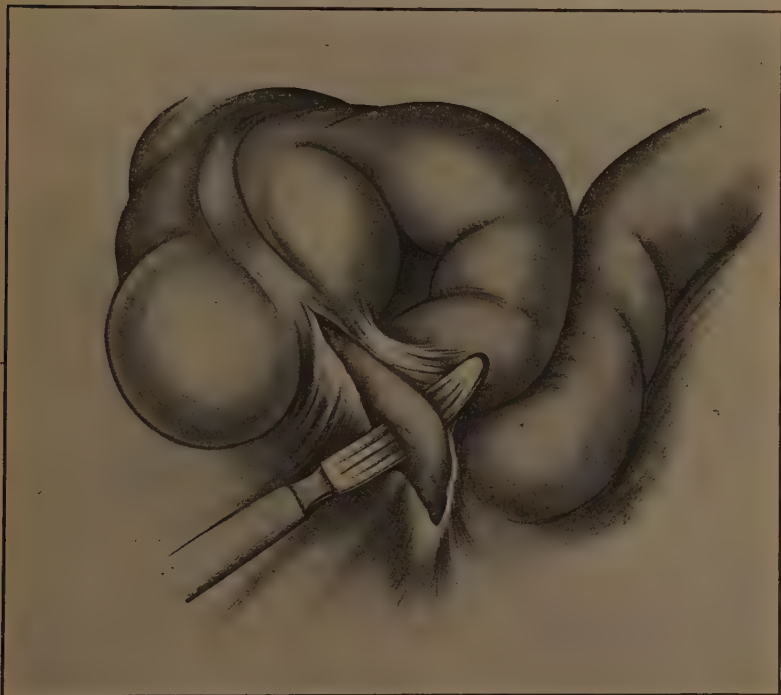


FIG. 250.—Appendectomy. The appendix buried. "The muscular coat is separated from the peritoneal by blunt dissection."

abdominal cavity should be very carefully performed before interfering with the cæcum or the mass of adhesions in which the appendix is buried. Sometimes one will find the anterior abdominal wall adherent to the mass beneath the incision, in which event packing can be dispensed with, but any opening in the wall of adhesions should be carefully plugged, both to pre-

vent leakage of pus into the healthy peritoneal cavity and protrusion of healthy gut into the infected region. If there are no such adhesions the abdominal cavity should be protected, below, toward the median line, and above, by a sufficient number of sponges to prevent contamination. It is true that intra-abdominal pressure will usually cause all pus to flow outward, but the



FIG. 251.—Appendectomy. The appendix buried. The entire appendix is brought out minus its peritoneal coat.

collapse of a large abscess cavity, when the patient is anæsthetized and the muscles relaxed, might allow pus to escape into the general peritoneal cavity.

The mass should be broken into with the finger, which seeks out the lines of least resistance between the coils of adherent

gut, and it often happens that the appendix can be quickly outlined, especially in cases which have lasted but three or four days. If it cannot thus be found, the anterior cecal band should be traced to its base, and adhesions gently pushed away as the finger outlines the appendix, until it can be demonstrated as



FIG. 252.—Appendectomy. Clamping the mesentery.

before. In an old abscess case in which the appendix forms an integral part of the median wall, and in old retro-cecal abscesses which are best opened extraperitoneally, it may be injudicious to seek the appendix at all, both because the peritoneal cavity will be badly contaminated and because absorption from these

surfaces is extremely rapid, but these cases seem to grow more rare as one's experience increases.

Ligation of the Mesentery and Treatment of the Stump.—The mesentery should be ligated in one or more sections, depending upon its length and thickness. Clamping may precede the

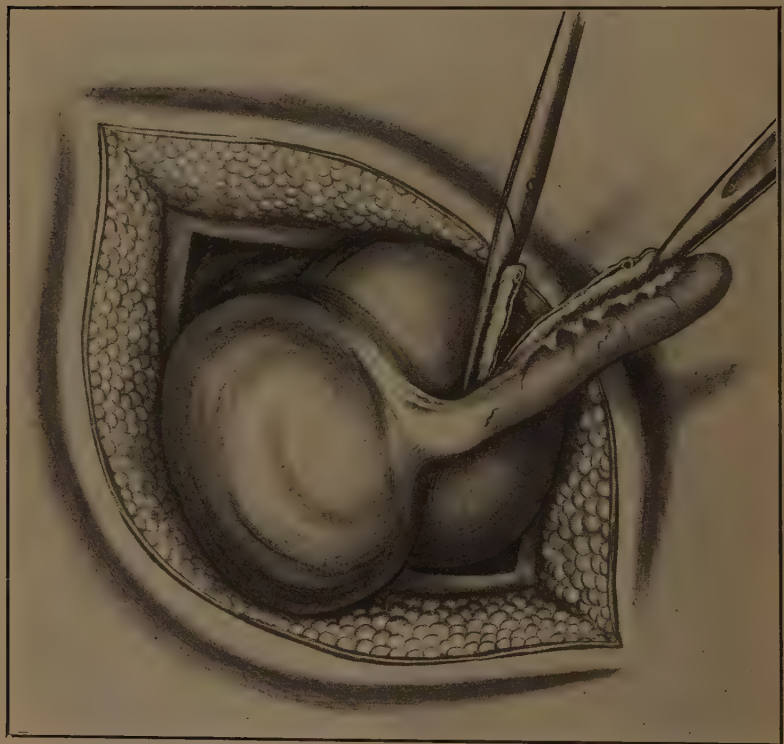


FIG. 253.—Appendectomy. The mesentery severed.

ligature if the mesentery is readily drawn up, but with a short fat mesentery, or one friable from œdema, it is safer to tie *in situ*, snipping away as much as has been safely ligated. Very short stumps, and loosely placed ligatures and sutures, have no place in the removal of an appendix unless one wishes to reopen in the middle of the night to stop hemorrhage. Care is neces-

sary in ligating the mesentery not to catch the wall of the ileum, or kink the ileum at its junction with the cæcum.

Before the appendix is amputated the intestine and abdominal incision should be protected with sponges, else local peritonitis with subsequent adhesions, or abscess in the abdominal wall, is bound to follow in a fair proportion of cases.

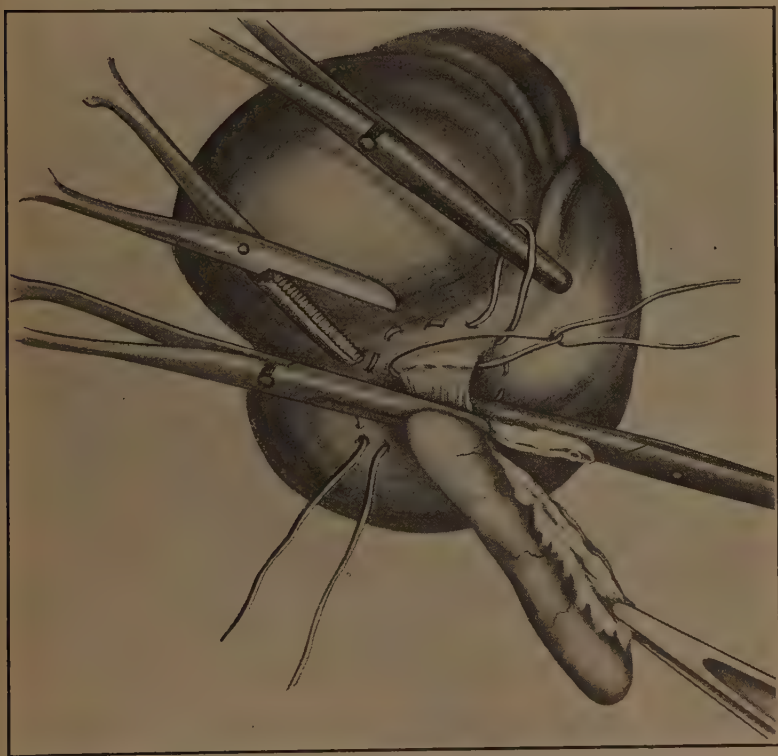


FIG. 254.—The purse string suture laid, the base of the appendix crushed. A plain catgut ligature in position to tie around the crushed portion.

Many methods of managing the stump have been devised. Ligation of the base, amputation of the appendix, and cauterization of the exposed mucosa being the simplest, and this may be practised with satisfaction whenever drainage must

be employed. According to some good authorities the same simple treatment is perfectly adequate in all cases, but such treatment of exposed infected stumps would scarcely be considered good practice in intestinal resection, and appendectomy is but a miniature resection. Burying the exposed stump in the raw surface of the mesentery also has its advocates. On the whole, that method which consists of crushing the base with

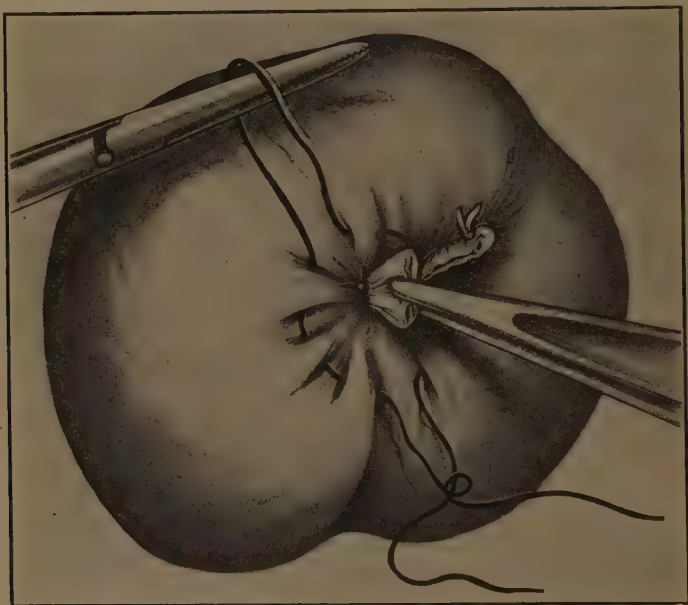


FIG. 255.—The mesentery ligated. The stump crushed and tied and ready for inversion.

hæmostats to force the mucosa away from the place of ligation, tying a fine plain catgut ligature in the groove thus formed, amputating the appendix beyond the ligature, cauterizing the little cup in the stump, and then invaginating the stump into the cecal wall with a purse string suture, appeals to one's sense of surgical neatness and finish, and its results bear out this feeling.

The purse string suture should be laid before crushing the

appendix, and additional finish and security are accomplished by a running suture of fine catgut which whips over and buries the purse string and extends over the entire cut surface of the mesentery. This last suture many times can be so applied as to leave no raw surface whatever in the abdomen.

The cæcum is now sponged off with warm saline and replaced, if it has been drawn out. If a beginning abscess were present,

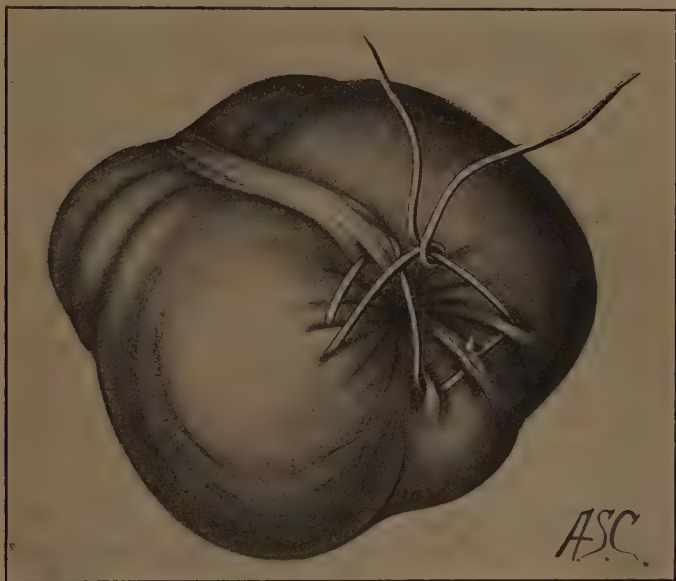


FIG. 256.—Appendectomy. A suture of fine catgut buries the purse string and extends over the cut edges of the mesentery.

its cavity is carefully sponged and dried and a last look is taken to make sure that no hemorrhage persists. In chronic cases, and in acute cases with no infection outside the appendix, the abdomen is closed in layers. In the presence of pus drainage does no harm and may save life. The extent and character of the drainage depends upon the conditions present and deserves special consideration.

If a peri-appendicular abscess is strictly localized and well

walled in on all sides, nothing more than a fair-sized soft rubber drain is necessary.

If there is an abscess whose walls are not adherent to the anterior abdominal wall, so that escaping pus must traverse some portion of the free abdominal cavity, it is judicious to fluff into it a considerable quantity of gauze in addition to the tube, not to serve as a drain but to keep healthy intestine out of the infected territory and to stimulate the early formation of adhesions about the gauze, and so protect the peritoneal cavity.

If the abscess is very large and the infection is virulent as revealed by the patient's condition, it is occasionally judicious to insert no sutures, merely opening and draining and keeping healthy intestine back by a light gauze cofferdam.

At times there is no local abscess, but the appendix is perforated and the peritoneum about it very much reddened and scalded in appearance, while coils of intestine whose peritoneal coat is not involved are in close proximity. Under such circumstances the light cofferdam separating healthy from infected territory is eminently judicious.

Many times one will find only an area of local infection about a perforated or gangrenous appendix, while the preceding severity of the symptoms and the tenderness and rigidity over the anterior wall led him to suspect a diffuse peritonitis. In such a case, if a clean finger or stiff drainage tube is pushed through the lower end of the incision into the pelvic cavity, one is usually rewarded by a gush of pus and sero-purulent fluid. A drain should then be placed to the bottom of the pelvic cavity, which not only will drain what would otherwise become a residual abscess, but may abort a threatened peritonitis. Such a drain may be brought out of the lower angle of the incision, or through a stab wound low in the median line, or into the vagina through the cul-de-sac. The first and last are better than the median stab wound, which passes between free intestinal coils throughout its entire length and sometimes gives rise to bands of adhesions and subsequent obstruction. When possible, it

is best to have abdominal drains in contact with parietal peritoneum.

Much harm is done by the early removal of gauze drains and packs. If these are made of iodoform gauze they do not become offensive for several days and may be retained until thoroughly loosened. Early withdrawal of gauze which is in contact with peritoneum breaks up protective adhesions, produces considerable bleeding, and may drag intestine into the depths of the incision where it becomes adherent and forms the starting point for a post-operative hernia. Tube drains should be allowed to remain until the cavity in which they are placed has collapsed, and the external orifice is as large as the bottom of the drainage tract.

The foregoing discussion of drainage following operation for acute appendicitis may seem uncalled for at a time when the disposition among surgeons has become so pronounced in favor of removing the appendix and allowing nature to care for the remaining infection once its cause is removed, but the fact that infection has spread beyond its original site is evidence that nature is not all-sufficient, and the time will soon come when the tendency to trust to nature will be overthrown in favor of the plan of trusting only so much to nature as cannot quickly and safely be removed.

VISCERAL PTOSIS

Ptosis of some or all of the abdominal viscera is often found in association with gynæcological disease, and the question then arises as to whether one or the other is the cause of the symptoms of which the patient complains, and whether interference with the ptosed viscus is necessary.

The last word cannot be said concerning visceral ptosis, but in a general way the following propositions are true:

1. Displacement of a viscus in such manner as to interfere with its normal functioning, causes discomfort.

2. Displacement in such manner as to interfere with the normal blood supply, provokes symptoms.

3. Traction upon the normal attachments produces disturbances in some patients and none whatever in others.

As an example of the first proposition may be cited a prolapsed but otherwise normal stomach, the pyloric end of which is so fixed that the stomach fails to empty itself as it should.

As an example of the first and second, a floating kidney may become so rotated as to interfere with the venous return through the renal vein, and simultaneously the ureter may be so bent upon itself as to cause acute hydronephrosis and a true Dietl's crisis.

Illustrating the third, we see patients whose transverse colons together with practically all the small intestine, are contained in the pelvic cavity, some of whom feel better when lying down with the hips elevated, and some of whom feel so well that it is impossible for them to feel better. In these patients there again comes into view the fact that some nervous systems are hypersensitive and in such a state of unstable equilibrium, as concerns sensations, that minor disturbances suffice to produce major results.

There is no doubt that a prolapsed transverse colon is sometimes the cause of trouble and that a pelvic cæcum sometimes gives rise to pain, but this is far more likely to follow if they are anchored in their position by adhesions. Peristalsis which normally suffices to push a fecal mass directly up the cæcum ought to be sufficient to force it through a prolapsed transverse colon if the latter is unhampered and unknicked by adhesions. Likewise a prolapsed stomach should make no trouble if it is *all prolapsed* so that it empties within the normal time, but just what effect is produced by constant traction upon the gastro-hepatic omentum is uncertain.

Ptosis so marked that the viscera descend well into the pelvic cavity is a cause of backache, but whether this is from mesenteric traction, or from the static effect of constant tension of the

lumbar muscles in an unconscious effort at preserving the bodily equilibrium, is unknown. Pregnant patients and those with abdominal tumors often suffer from a similar backache which is probably static.

Ptosis of the stomach and transverse colon, to such an extent or of such form that marked symptoms are produced, should be dealt with surgically if bandages fail to overcome the symptoms.

Pelvic adhesions which hold either the stomach or colon out of position should be released if the abdomen is opened for any purpose.

For the symptom-producing, prolapsed stomach and colon without adhesions, Rovsing has described the most satisfactory operation, and one which withal accomplishes its object.

It is obvious that a kidney whose displacement is of such a character as to produce repeated attacks of hydronephrosis needs surgical attention, either nephropexy or nephrectomy. The ordinary movable kidney scarcely needs fixation unless the patient has other lesions which demand anæsthesia and surgical intervention. The author is constantly leaning toward conservatism in advising operation for movable kidney, *per se*, because the results of nephropexy are so often unsatisfactory; and on the contrary, when interference is positively necessary, he is becoming more radical in advising removal of the offending organ, providing the other kidney is not only present but functioning satisfactorily.

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CHAPTER XIX

GYNÆCOLOGIC SURGERY

In appropriate places and in connection with various operative procedures, mention has been made of such preparation for operation, methods of securing asepsis, suture material, etc., as seemed necessary for the particular operation. The present chapter takes up a more systematic discussion of the principles and details of gynæcologic surgery.

General surgical technique is the same no matter what portion of the body is invaded, but the details are somewhat modified by the anatomy and physiology of the locality.

Pre-operative Treatment.—Excepting in cases of dire extremity, such as ruptured ectopic pregnancy, torsion of the pedicle of an ovarian tumor, and intestinal obstruction, there is abundant time in gynæcology for pre-operative observation and treatment. In considering pre-operative treatment it should be borne in mind that gynæcologic surgery may be divided into two classes: first, the surgery of necessity; second, the surgery of election. To the former belong those operations which are needed in order to save or prolong life; to the latter those which are designed to relieve discomfort. An operation may be perfectly justified in the first class under circumstances which would prohibit operation in the second. Treatment designed to place the patient in the best possible condition is often judicious for one who must have an ovarian cyst removed or a fibromatous uterus extirpated, even though she has diabetes, nephritis, or a bad heart lesion, while the propriety of doing a trachelorrhaphy, perineorrhaphy, or round ligament operation on a patient having such vascular or systemic diseases would be

very questionable. Such pre-operative treatment is distinctly medical and must be undertaken on general medical principles.

Under ordinary circumstances the pre-operative treatment is limited to such measures as will make operation safe and rapid, and minimize discomfort.

It is wiser to have the patient in the hospital a day or two before operation. By so doing she becomes familiar with her surroundings, and the emotional excitement incidental to leaving home will have subsided. The nervous strain to which most women are subjected by forcing them suddenly into unfamiliar surroundings is not sufficiently appreciated.

Diet.—The diet, immediately preceding operation of any kind, should be restricted because digestion is likely to be disturbed through anxiety, and emotional loss of appetite is a physiological safeguard. If an abdominal operation is contemplated, the simplest forms of food and those which leave but little residue should be selected, and the ordinary hospital liquid diet, without milk, is ordered. Milk should not be taken because in many individuals flatulence is an almost regular sequence of its ingestion, and a flaccid undistended intestine is much to be desired. If only a vaginal operation is to be done the dietary restrictions need not be so severe, as intestinal distension does not interfere with the operative manipulations, but the patient is more comfortable, and post-operative elevation of temperature is less if the stomach and bowels are empty.

An abundance of water should be taken on the day and night preceding operation, as post-operative thirst is thereby minimized and the urinary output increased. Both food and water should be discontinued from three to five hours before the time set for operation so that the stomach may be empty when the anæsthetic is administered.

Catharsis.—Pre-operative catharsis aims to produce the same effect as restricted diet, viz., a flaccid empty bowel. A half ounce of castor oil taken early on the night preceding opera-

tion usually acts in a few hours, and if an enema is given at least four hours before operation the bowel is likely to be found in a thoroughly satisfactory condition. The taste of oil can be disguised by floating it on orange juice or making an orangeade "sandwich," and it is not nauseating when the taste is well covered. Drastic purges not only weaken the patient, but they also fill the bowel with gas and intestinal secretions, and it is rare indeed that a single dose of oil is not satisfactory if followed by one or two low enemas. If vaginal work is contemplated care must be taken that the enema is given several hours before operation and that it is entirely expelled, else the operative field may be soiled by its evacuation after the patient is anæsthetized. In very nervous patients it is sometimes necessary to insert the rectal tube in order to be assured that the lower bowel is empty, and the nurse should do this if she finds that less fluid has been expelled than was introduced.

Medication.—Very apprehensive patients do better if they are given a sedative the night preceding operation, wholly aside from its administration as an aid to anæsthesia. A full dose of sodium bromide is sufficient for mere "nervousness," but the extreme apprehension which may precede a dangerous abdominal operation should be met by a small dose of opium in some form. The difference between a patient who literally is half frightened to death, and one who is composed, sometimes measures the actual difference between death and recovery.

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ASEPSIS AND ANTISEPSIS

Volumes have been written on this subject without exhausting it, and its evolution from the crude methods of Lister to the simple efficient methods of the present time makes an interesting study, but the whole practice of asepsis is based upon a few fundamental facts.

Surgical infection is dependent upon the introduction of pathogenic bacteria into a wound in sufficient numbers, and of

a requisite degree of virulence, to overcome the resistance of the tissues of that particular individual.

Infection does not occur if there are no bacteria whatever in the wound, a condition which is never fulfilled clinically, or if their numbers are so small and their virulence so slight that the natural immunizing powers are sufficient to neutralize their effect or destroy them altogether.

Clinical asepsis is obtained by minimizing the number of bacteria of *any kind* which gain access to a wound, and entirely preventing the entrance of *virulent* organisms, plus such methods of handling the tissues as shall best preserve their power of resistance. Bacterial contamination is the well-understood factor of the problem; no bacteria, no infection. Resistance of the tissues is less perfectly understood, but its influence is certainly greater than is generally appreciated. The great majority of patients show so much resistance to infection that sloppy and even careless aseptic technique *usually* succeeds, but universally good results can be obtained only by the most painstaking attention, both to aseptic details and the preservation of the vitality of the tissues.

Preparation of the Operative Field.—It is fortunate that nature in every instance provides this resistance to, or immunity from, infection, as complete sterility of any operative field is impossible, and heroic efforts to provide an absolutely aseptic field are more likely to damage nature's protective mechanism than to secure the desired sterility. The last word has not been said on this subject, but the following methods have been carried out by the author with a minimum of trouble, and in a recent series of 500 operations not a single serious infection arose, and *no infection* of any kind took place unless the wound had been soiled by infectious material from the interior of the abdomen.

The day preceding operation the patient is given a sponge, not a tub, bath and the vulva is shaven. If the operation is to be limited to the vagina a douche of sterile soap suds is given,

followed at once by a lysol or creolin douche in the strength of $\frac{1}{2}$ to 1 per cent. No especial emphasis is laid upon the germicidal power of such a douche—it is the mechanical cleansing which is important—but as the patient remains in bed and a small quantity of solution is retained in the vagina there undoubtedly is some inhibiting power in the douche itself. The douche is repeated on the morning of the operation.

After the induction of anæsthesia, the patient is placed in the lithotomy position and a sterile gloved nurse scrubs the vulva, inside of the thighs, and buttocks with soap and water, using gauze instead of a brush for this purpose. Care is taken that the anus is scrubbed last of all, no sponge that has come in contact with the anus being used elsewhere.

After the external parts are thoroughly cleansed the vagina is scrubbed with soap and water, using sponges rather than a brush, and the entire field “both internal and external” is thoroughly douched with sterile water poured from a pitcher. The preceding is unquestionably the important feature of the preliminary technique, but out of deference to general surgical opinion the parts are again washed with a 1 to 3000 mercuric chloridè solution, the latter being douched away with sterile water.

Great stress is laid upon the thorough but gentle performance of the mechanical cleansing, so that cleanliness is assured without abrasion of the skin or mucous membrane.

If an abdominal operation is contemplated, the bath is given as before and the abdomen shaved. The nurse carrying out the preparation then prepares herself as for an operation, and proceeds to scrub the abdomen with soap and sterile gauze. The soap is removed with sterile water, the abdomen scrubbed with alcohol which is not removed, and a sterile dry dressing applied to remain until the patient is on the table. Here one of two methods is used. Either *A*, the abdomen is again scrubbed with soap and sterile water, next with alcohol, next with Harrington’s solution, which is left for one minute

and then washed off with alcohol, after which the abdomen is covered with a sterile towel; or *B*, the abdomen, which has not been touched with water since the preceding evening, is painted once with tr. iodine of the regular pharmacopeal strength and left uncovered until thoroughly dry.

Method *A* gives perfect results, but it wets the patient and her clothing which is a decided disadvantage.

Method *B* also gives perfect results but occasionally produces severe skin irritation. No attempt has been made by laboratory tests to establish the relative sterility secured by the two methods, as the laboratory can establish the presence or absence of bacteria only, the effect upon the resistance of the tissues not being demonstrable.

The fact that stitch openings in the skin readily become infected when catgut is used for superficial sutures led to a clinical test, skin sutures of chromic catgut being used in a large number of cases with the result that less redness showed about them after method *B* than after method *A*.

It is noticeable, even when the iodine is given time to dry thoroughly, that after the operation is completed the skin has resumed its original color, the iodine having disappeared. This means that sponges crowded into the abdomen and intestine which protrudes, have wiped the iodine from the skin, and a certain portion of it must have been carried into the abdominal cavity. It is desirable to prevent this by the attention to the drapes which is mentioned later.

Hand Disinfection.—Those things which come into contact with a deliberately inflicted operative wound are the air, sponges, instruments, suture material, towels and sheets, water or solution, and the hands of the operator and his assistants. Experience has shown that the first can be ignored providing it is not grossly contaminated by dust; all else excepting the hands can be sterilized so absolutely as to be germ free. The sterility of the hands is always relative. The hands are therefore covered with rubber gloves which are as readily sterilizable

as the other material coming into contact with the wound, but which are of so delicate a character as to be easily pricked or torn. For the latter reason hand disinfection must be as scrupulously practised when gloves are worn as when they are not. Assistants and nurses who dress infected wounds should be banished from the operating room, as the complete removal of bacteria from the hands is impossible of accomplishment by any method which permits of its daily use without destroying the integrity of the skin.

The first and prime feature of hand sterility is the avoidance of hand infection. Any and all infected wounds which must be dressed, examined, or otherwise handled, should, both literally and figuratively, be handled with gloves. All dressings should be handled with instruments, never with the fingers; rectal and other dirty examinations should be made only with gloved hands. In this way and this way only can contamination of the hands by virulent organisms be prevented. Organisms not virulent can be so reduced in numbers by ordinary methods that the hands are relatively, though not absolutely, sterile.

Scrubbing with soap and sterile hot water is the measure of most importance in the technique of hand sterilization, and this scrubbing should be continued until the hands are clean.

Cleansing the space under the nails, if done at all, should be performed before scrubbing is begun, not afterward. If the nails are kept short and a stiff brush is used for scrubbing the preliminary scraping of the nails is not needed, and it is of doubtful propriety in any event as it keeps the nails rough and more liable to accumulate dirt.

A routine time for washing the hands is ridiculous since one man will brush twice as hard and twice as fast as another. The scrubbing should begin by soaping the hands well, rubbing in the soap until a good lather is formed, and then going briskly over each finger separately and on all sides, giving particular attention to the end and palmar surface. The lather

should be washed away with hot water and the process repeated time and again until the hands are thoroughly clean. For one who brushes briskly 15 minutes is sufficiently long, but a lazy or indifferent assistant should be kept at his task for 20 or 30 minutes. Running water should be used unless the wash bowls are above suspicion, a condition which is rare even in well-conducted hospitals. After removing the soap with sterile water various methods of chemical sterilization are practised, the defect in each of them being the fact that chemical sterilization by any agent which will not destroy the skin requires immersion in the solution for many minutes. The perfunctory dipping of the hands in mercuric chloride solution for a few seconds sterilizes nothing but the operator's conscience. After trying many methods, including staining the hands and forearms with strong permanganate of potash solution and bleaching with oxalic acid, immersion for many minutes in 1 to 2000 mercuric chloride solution, bathing in nascent chlorine generated by covering the hands with chloride of lime paste and rubbing with sodium carbonate crystals, the author has settled down to the use of 95 per cent. alcohol for the final step following the soap and water scrub. While alcohol is by no means a strong rapid germ destroyer, it washes off the soap and sebaceous secretion and actually gets to the skin with its hair and sebaceous follicles—something that watery solutions never do—and it leaves the hands in perfect condition without cracking or destroying the skin.

Sterilization of Other Materials.—All watery solutions to be used about the patient are sterilized by boiling for 20 minutes. In the absence of spore-bearing bacilli five minutes is sufficient, but the absence of spore-bearing organisms is never taken for granted.

Dirty water, even if sterile, should not be used, filtration or distillation being necessary unless the water was originally clear. Dead bacteria and bacterial products are not entirely innocuous as studies of the production of anaphylaxis are

constantly revealing. All utensils for holding solutions should be sterilized either by boiling or by superheated steam.

Gloves may be sterilized in either manner, but boiling in plain water is sure *if the gloves are entirely submerged*. If sterilized with the dressings in the autoclave the fingers should be held open by a light stuffing of gauze.

Gowns, towels, sheets, drapes, and gauze sponges and dressings are sterilized in the autoclave or pressure sterilizer.

Bacteriological standardization demands fractional steam sterilization for three successive days in order to allow time for the development of spores and their destruction as fully developed bacilli. Practically, this is necessary for gauze sponges and dressings only, the preceding boiling of towels, sheets, etc., in the process of laundering, being sufficient to destroy any previous contamination.

Material to be steam-sterilized should be loosely packed, else the steam fails to penetrate to the center of the package and imperfect sterilization is the result.

All instruments used in operating are sterilized by boiling for 20 minutes. As plain water tends to the formation of spots and rust, a 1 per cent. sodium carbonate solution is used instead.

Knives and scissors are quickly dulled by boiling, so that some surgeons prefer to immerse them in 5 per cent. carbolic solution previous to operating. This is not safe unless the scissors have aseptic locks, and even then it presents a weak link in an otherwise perfect chain of asepsis. Scissors should be boiled with the other instruments, and clamps should be opened before boiling. If the jaws of clamps are closed so that no water enters between them only dry heat sterilization is effected, and this is wholly inefficient below 400°F.

Knives should be thoroughly scrubbed, washed with alcohol, the blades wrapped in cotton and boiled for three minutes, or they may be laid in liquified carbolic acid for one minute and immediately transferred to 90 per cent. alcohol.

Silkworm gut, silk, linen, and silver wire, all can be sterilized in the steam sterilizer by utilizing large ignition tubes as containers, in which the suture material is placed wound loosely and in thin layers on spools, the tube then being plugged with cotton as in the bacteriological laboratory. Fractional sterilization for one-half hour on three successive days insure absolute sterility until the tube is opened. Owing to the possibility of contamination after the tube is opened and the great number of tubes which are needed if this method is carried out, it is deemed preferable to boil such suture material with the instruments, the silk and linen being loosely wound on pieces of gauze. Repeated boiling destroys the tensile strength of silk and linen, but where daily operations are performed the surgery nurse soon learns to estimate the approximate quantity of material which it is necessary to prepare for each operation.

The preparation and sterilization of catgut has been the *bête noire* of surgeons since its introduction as a material for sutures and ligatures. As prepared from the sub-mucosa of the intestine of the sheep it is originally contaminated by many organisms, the most dangerous being the tetanus bacillus. The difficulty of securing positive sterility has been so great that many surgeons either have not used it at all or have discarded it after a series of disasters. Its absorbable character, however, makes it so desirable for use in many regions that constant effort has resulted in devising methods by which sterility is assured. For a description of some of these the student is referred to Binnie's Surgery.

For the occasional operator, and even for the one who is operating daily, it is better to purchase catgut already sterilized and preserved in breakable tubes, unless he has behind him a well-equipped laboratory devoted to catgut preparation and a capable bacteriologist to check up the sterility of the resulting product. This is impossible in any but the largest hospitals, and while the commercially prepared gut is exper-

sive, and sometimes very unsatisfactory, its sterility cannot be questioned if supplied by reliable manufacturers. Some undoubtedly sterile gut is so over-hardened as to be practically non-absorbable, and such gut is frequently extruded from a wound months after its introduction, while other makes have lost their tensile strength during the process of preparation.

Gut prepared by the Bartlett process and preserved in a weak iodine solution has been found to preserve its tensile strength remarkably well, and the finest strands are so strong that heavy sutures and ligatures are not required. The principal objection to this gut is the impossibility of boiling the tubes in which it is contained, and in order to preserve an unbroken chain of aseptic technique they should be immersed in strong carbolic acid for several minutes and then kept in alcohol until used.

Immersing the tubes in watery solution of mercuric chloride is not safe unless the solution is very strong and all grease has been removed previously by washing with alcohol or ether.

Preservation of Sterility.—The original sterilization of everything coming into contact with an operative wound is comparatively simple; it is in the preservation of this condition of sterility until the wound is closed and the dressings applied, that the technical aseptic skill of an operating room corps must be estimated. To the end that there be no accidental contamination, all instruments, solutions, trays, etc., should be covered with sterile towels until wanted. The operator, assistants, and nurses should be covered from head to foot by sterile gowns and masks. Nothing should be touched by the gloved hands that is not surgically clean. Talking or laughing over a wound or over instruments should be prohibited. The less the material which goes into a wound, the less the risk. Running sutures through the fingers, dipping them in sterile water, frequent washing of the hands, etc., etc., is likely to lead to contamination through accidental soiling of water standing open in containers; in fact the simpler and more straight-

forward the entire operation the less the risk of accidental infection.

In abdominal operations sterile towels should be pinned or clamped to the edge of the wound as soon as the abdomen is opened, both to prevent possible infection from the abdominal skin and the carrying of iodine into the peritoneal cavity.

In vaginal operations neatness and dexterity in keeping instruments, fingers, and sutures away from the anus is imperative if perfect results are to be obtained, and that instant, almost instinctive, revolt at contact with anything not surgically clean which has been dubbed the "aseptic conscience," is necessary in order to secure uniformly perfect results.

In one sense it is unfortunate that every contaminated wound does not become infected and break down, as such an object lesson would prevent the carelessness which is so frequently engendered in surgeons, assistants, and nurses, by the relatively few mistakes in technique which are followed by openly bad results. One poor technician can destroy the aseptic morale of an entire operating room force, simply because his patients rarely die and an occasional suppuration is regarded as inevitable.

ANÆSTHESIA

The most important single consideration in the average operation, so far as concerns immediate danger to life, is the anæsthetic and its administration. The technique of the administration of general anæsthetics must be learned both by careful study and by the actual administration of the various agents under competent supervision, and only a general discussion of anæsthetics and their selection, their indications and contraindications, will be undertaken here.

Local anæsthesia has a limited field of usefulness in gynæcologic surgery, but within this field some of its applications are of great importance. The three drugs most frequently used are cocaine, novocaine, and quinine and urea hydrochloride

Cocaine is the most powerful and also the most toxic of the three, and its use is becoming restricted to examinations, such as cystoscopy, and operations like the removal of urethral caruncle, in which its surface application is sufficient. A 4 or 5 per cent. solution applied to the urethra on cotton-wrapped toothpicks produces sufficient anæsthesia for cystoscopy or the removal of small caruncles without pain. The hypodermatic use of cocaine about the urethra and vulva is extra hazardous, and in view of the greater safety of novocaine it should be discontinued in favor of the latter drug. Incision of furuncles, Bartholinian abscesses, etc., is rendered painless by the superficial infiltration of the tissues with a 2 per cent. novocaine solution. Massive infiltration of infected areas with weak solutions of novocaine is contra-indicated as it is likely to spread infection, and quinine and urea hydrochloride should never be used for this purpose. Cervical and perineal repair can be effected under novocaine infiltration without operative pain if the operation is performed rapidly, but these are operations of election in which primary wound healing is the sole consideration, and as infiltration anæsthesia of any sort renders local infection and failure of union possible, it should not be used as the anæsthetic for plastic work. Nerve blocking outside the operative area is possible in repairing both lacerated cervixes and perinei, but the necessity for operation in such cases is rarely so urgent that it must be done in the face of contra-indications to general anæsthesia. While the actual operative work can be rendered painless, traction upon the cervix, dragging upon the vulva, and accidental pricks with the needle, render such operations anything but comfortable for the patient.

The most important indication for local anæsthesia in gynecology is for exploratory incision, either through the posterior vaginal cul-de-sac or anterior abdominal wall, in patients who are in bad general condition, and for the evacuation of intra-

abdominal pus under the same circumstances and through the same avenues.

Under local anæsthæsia an occasional major abdominal operation can be completed by a rapid operator without the infliction of much pain, but if the conditions found on exploration demand considerable intra-abdominal manipulation the quantity of general anæsthetic needed is greatly reduced, because the patient does not resist the induction of anæsthæsia. It is frequently possible to complete an operation before the patient is profoundly anæsthetized, and close the wound while she is recovering.

This particular sequence, local followed by general anæsthæsia, is life saving in very severe septic conditions, in some ruptured extra-uterine pregnancies, and in patients with such serious disease of the heart, lungs, or kidneys that full surgical anæsthæsia is extra hazardous.

Spinal Anæsthæsia.—Spinal anæsthæsia, induced by the introduction into the subdural space of cocaine, novocaine, or stovaine solution, has a very limited field of usefulness. In the hands of those expert in its use, like Babcock of Philadelphia, it is satisfactory, but the technique of administration must be carefully carried out. Even then its risks are considerable and it is not advised for general use. If one employs an expert anæsthetist it must be very rare that the occasion will arise when local anæsthæsia, plus nitrous oxide or ether, is not as safe and satisfactory as spinal anæsthæsia.

Inhalation Anæsthæsia.—The three general anæsthetics which always demand consideration and from which a selection is to be made for the individual case are ether, nitrous oxide, and chloroform.

Ether.—Under ordinary circumstances ether is the anæsthetic of choice. It is not expensive, its administration is the most easily learned of the three, and when properly given a death on the table is almost unknown. It has the further advantage that the operator himself can to a great extent super-

vise its administration without distracting his attention too seriously from the work at hand. It is not to be understood by this that ether should be given by a novice, but only that if necessary it may be so given with relative safety, sudden death without ample warning being so rare as to be negligible. The comfort which an operator feels, and the ease and smoothness with which he does his work, when the anæsthetic is given by a trained anæsthetist, are so superior that such a person should be secured when at all possible.

Ether has some disadvantages which are peculiarly its own. It is dangerous when given to an asthmatic, and some of the difficulties occasionally met which are attributed to over-secretion of mucus are really due to expiratory spasm of the respiratory muscles, a condition which is quickly overcome by the substitution of chloroform for ether.

Ether is dangerous if the patient has an acute "cold," whether nasal, laryngeal, or bronchial, and an emergency abdominal operation in a patient with pneumonia would be out of the question if ether were our sole anæsthetic resource.

The administration of ether is followed so quickly by bronchitis or broncho-pneumonia in a rather high percentage of cases if la grippe, coryza, or bronchitis is present, that one must assume that ether irritates the respiratory mucosa sufficiently to cause a *locus minoris resistens* in patients who might have thrown off the infection if ether had not been given. Whether this is due to a general lessening of the normal resistance, to inhalation of mucus and infected saliva, or to the direct irritation of the bronchial mucous membrane, is not important. The fact remains and must be reckoned with during epidemics of infection of the respiratory tract.

Ether is hazardous in nephritics, especially in those who are the victims of acute nephritis, sudden complete suppression of urine being one of the disasters which may overtake such a patient after ether has been given.

Ether is dangerous in uncompensated heart lesions and myo-

carditis, but so are all the general anæsthetics, and if one must be given ether is safer than the other two. It is rare, however, that one must operate under such a handicap, and still more rare that local anæsthesia will not suffice if an operation is imperative.

Even under the most favorable conditions of general health, ether has the disadvantage of being disagreeable to inhale and of leaving intense thirst and severe nausea in its wake. Efforts have been made to minimize the latter by stomach lavage before the patient regains consciousness, and by the administration of olive oil as soon as swallowing is possible. Both methods probably reduce the disagreeable after-effects, but they cannot be entirely eliminated as some of the nausea is central in its origin.

In spite of its drawbacks, however, ether must be the anæsthetic of choice in the greater number of abdominal operations because it is much safer than chloroform and it produces complete relaxation, in which respect it is superior to nitrous oxide.

Nitrous Oxide.—The discovery many years ago that nitrous oxide anæsthesia could be maintained almost indefinitely, if oxygen were administered simultaneously, was not taken advantage of until within a very recent time. It has been extensively advocated in the last decade, both by those who are scientifically interested and also by those commercially interested in the sale of the gas and the apparatus for its administration, and it is somewhat difficult to decide where scientific interest ceases and commercial interest and advertising begins.

Having used nitrous oxide in approximately 25 per cent. of his operative work for the past 10 years, the author feels that the following review is based upon a sufficient knowledge of its drawbacks as well as its advantages. Briefly, its disadvantages in gynæcology are that it is the most dangerous of the three general anæsthetics unless an anæsthetist of wide experience and special training with nitrous oxide is employed, and

unless the gas is scientifically prepared and chemically pure. When both of these conditions are fulfilled it is the safest anæsthetic known, but even then it is not, as is so frequently stated, absolutely safe. No agent of which we have any knowledge is perfectly safe when given to the stage of complete unconsciousness. Nitrous oxide is expensive, and to many people in moderate circumstances the expense is prohibitive if sufficient care is taken in the preparation and testing of the gas to make certain that dangerous impurities are absent.

In robust muscular patients it fails to produce reasonable relaxation, and in some marked rigidity persists—indeed there are a few individuals who cannot be anæsthetized to the surgical degree by nitrous oxide. In abdominal work this rigidity is the source of much annoyance. The wound edges are severely bruised in efforts at keeping the incision open, and the operator is constantly hampered in his work by his inability to deal deftly and directly with the organs to be removed. In addition to the muscular rigidity itself, it is universal experience that the intestine is more markedly distended under nitrous oxide anæsthesia than it is under ether or chloroform, and protruding gut is always in evidence until the operative field is completely walled off from the general abdominal cavity. This means that the individual surgeon requires more time in which to perform a given task than he would if one of the other anæsthetics were employed, and in a few cases too much time means a fatality.

In connection with this it must be stated that something, either the oxygen administered or the carbon dioxide retained, stimulates the patient while anæsthesia is maintained, and this occasionally leads to puttering slow work and collapse after the patient is returned to bed. It is possible that some of the tendency to collapse is brought about by the almost instant awakening, so that the patient is fully conscious in a few minutes after the anæsthetic is withdrawn and therefore is subject to

more intense pain than during the slow awakening from full ether anæsthesia. On awakening after nitrous oxide anæsthesia the patient may be fully conscious before analgesia disappears, and often she will state that she is perfectly comfortable before leaving the operating room, while a look at her in bed 30 minutes later reveals a totally different picture.

The above criticisms apply to pure nitrous oxide-oxygen anæsthesia, but they are materially modified by a full dose of opiate preceding its administration, and the use of a small quantity of ether from time to time throughout the duration of the anæsthesia.

So far as the author knows there is no nitrous oxide apparatus in general use which does not have an accessory ether container by which a varying percentage of ether vapor can be added to the other gas, and in abdominal work this is almost universally used although the casual observer may not be aware of it.

By this addition the most satisfactory type of anæsthesia can be maintained, and the quantity of ether used is not great enough to cause the prolonged disagreeable after-effects of a pure ether anæsthesia, its only drawbacks being the expense and the necessity for an expert nitrous oxide anæsthetist.

Nitrous oxide-oxygen is the anæsthetic of choice for short maneuvers, like curettage and evacuating abscesses; it is also the anæsthetic of choice for plastic work about the cervix and vagina, as the after-pain is not severe.

Combined with ether in proper proportions it can be used for any operative procedure in the abdomen, but is much more frequently chosen when the patient is for any reason far below par, or the victim of bronchitis or nephritis. Very large tumors which distend the abdominal cavity and stretch the abdominal wall, can be removed as readily under nitrous oxide as under ether since the abdominal muscles are not especially rigid after the tumor is delivered, but the removal of tubes and ovaries which are adherent to the bottom of the pelvis is accomplished in half the time under ether that is required under gas. Ex

ploration of the entire abdomen is never accomplished unless ether in considerable amounts is given to the patient while the examination is proceeding.

Very long single operations, or a series of operations which require much time for their performance, are best performed under nitrous oxide-oxygen-ether anæsthesia, as it is after prolonged ether anæsthesia that its disastrous effects are most likely to be manifested.

To summarize: Nitrous oxide-oxygen anæsthesia is devoid of most of the disagreeable after-effects of chloroform and ether. It is safer when, and only when, pure, and administered by an expert. It produces, *per se*, less depression than chloroform or ether in patients below par in general health. It does not irritate the respiratory tract or kidneys. Once the patient is safely under its administration can be kept up almost indefinitely without harm from the anæsthetic itself.

On the other hand, it is expensive, it does not produce muscular relaxation, and it thus favors incomplete, imperfect work in the abdomen. Unless some form of local anæsthesia or large doses of opiates are used in addition, the patient suffers pain from the early awakening, providing the operation itself is productive of after-pain.

The addition of a minimum quantity of ether to nitrous oxide rids it of most of its inconveniences excepting the expense and the necessity for an expert gas anæsthetist.

Chloroform.—Chloroform labors under the same disadvantages that nitrous oxide does as regards the necessity for an expert administrator, and even then sudden death is far too common to render its use safe in northern latitudes. It is still quite popular in the South, and it is possible that its more rapid evaporation renders an over-dose less probable in warm climates than in cold. Nitrous oxide acts so well under circumstances which forbid the use of ether that about the only indication left for chloroform is an operation of necessity upon an asthmatic patient.

Mixed General and Local Anæsthesia on the Anoci-Association Theory of Crile.—This subject may equally well be discussed here or in connection with the question of surgical shock, as its development was brought about by Crile's well-known theory that shock is produced by sensory stimuli which exhaust certain nerve cells in the brain through over-stimulation, thus leading to the subsequent depression and vaso-motor paresis which goes under the clinical name of shock. In the effort at developing a method by which this might be prevented, nerve blocking was utilized by means of local anæsthesia of the area to be attacked, novocaine in 1 to 400 dilution being used to infiltrate extensively about the proposed line of incision. Certain intra-abdominal structures, such as the mesentery of the appendix and the broad ligaments, were further infiltrated, sometimes before and at other times after the pedicles were tied. As novocaine anæsthesia lasts but a very short time, 15 to 30 minutes, it is apparent that such infiltration could have only a momentary effect, so that solutions of quinine and urea hydrochloride were resorted to in the abdominal wall, the parietal sub-peritoneal tissue, and in all available ligaments, in an effort to prevent the conveyance of sensory impulses to the brain.

Two facts seem to have been conclusively proven by Crile's experience: one, that there is less post-operative pain; another, that post-operative elevation of pulse and temperature, the so-called aseptic wound fever, are somewhat lessened by this procedure.

That it materially minimizes shock in pelvic operations is open to debate, as but an extremely limited number of such operations are productive of sufficient shock to be clinically recognizable providing a bloodless operation is performed, and in those cases in which shock is most to be feared this method is not available, or at best to but a limited degree. In gynæcology, operations performed for profound sepsis, for ruptured ectopic pregnancy, and for carcinoma of the uterus,

are the ones in which shock is to be apprehended. According to the author of this method, quinine and urea hydrochloride must not be used in infected tissues or those to be drained, and it is thus ruled out from the first. In the radical hysterectomy necessary for carcinoma, nerve blocking to an efficient extent is difficult if not impossible, and in all three the added time necessary for the complete nerve blocking, upon which the author insists, might in itself turn the scale against the patient's recovery.

The effect of massive tissue infiltration upon wound healing, especially with quinine and urea hydrochloride, is questionable. The author of the method states that it lowers the resistance of the tissues so that wound infection is more easily produced. The lessened post-operative elevation of pulse and temperature can be explained upon the hypothesis of lessened absorption through the lymphatics leading from wounds which are compressed by a brawny exudate, as well as by any other. That unconsciousness may be present while nerve conductivity remains active is definitely proven by reflex acts during anæsthesia, twitching of muscles when their motor nerves are irritated, etc. As a method of anæsthesia which possibly lessens shock it very definitely deserves a trial as soon as its contraindications are plainly stated by those surgeons who have used it extensively, but until this is done it should be used with caution, as post-operative pain is readily overcome by safe doses of morphine, and a narcotic plus perfect wound healing is preferable to quinine and urea locally without a narcotic, if the latter necessitates sloughing wounds and post-operative hernia.

INSTRUMENTS

The instruments used in gynæcologic surgery are those used in surgery generally, with the addition of such as are required to gain access to the uterus and upper part of the vagina. Perineal retractors of various types are used for the latter

purpose. Dilators and long-handled curettes are necessary for gaining access to the cavity of the uterus and for removing its mucosa, whether for diagnostic or therapeutic purposes.

Knives, scissors, hæmostats, long-handled clamps, retractors, volsellum forceps, needles and needle holders, are the same as are utilized in general operations upon the organs in the ab-



FIG. 257.—Method of using author's modification of Beck's spoon as a retractor and light reflector.

dominal cavity. Special needles for cervical repair are of no great advantage, but no abdominal operation should be undertaken without a sufficient number of small round needles for possible work upon the intestine.

The author has devised a modification of the well-known

Beck's spoon by broadening the blade, lessening its concavity, and turning the handle away from the blade at an angle of 45 degrees, which renders it an excellent intra-abdominal retractor and an efficient light reflector as well. Clamps with detachable handles, such as those devised by Pryor, are very useful if vaginal hysterectomy is to be performed by the clamp method.

While a sufficient number of the instruments required should always be at hand, a multiplicity of special instruments, devised for every possible contingency, is not advised.

INCISIONS

The object of the abdominal incision is to secure an avenue of approach to the structures to be dealt with and no other con-

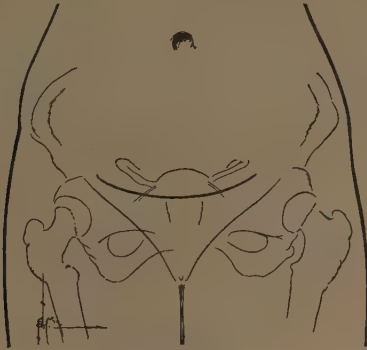


FIG. 258.—Line of transverse abdominal incision. Devised by Pfannenstiel.

sideration is of equal importance, but the factors of injury to muscles, fascia, and nerves should be taken into account, as well as the possibility of accurate suturing at the close of the operation proper. A crescentic incision, concavity upward, through the skin and superficial fascia at or below the superior margin of the mons pubis, followed by dissection of the flap, a transverse fascial incision, and a longitudinal incision through the peritoneum, is favored by many. This presents no ad-

vantage save the avoidance of a skin scar, and it seriously restricts the working space in the event that unexpected difficulties are encountered. In selected cases, however, this incision devised by Pfannenstiel gives a remarkably æsthetic result.

The best all around incision for pelvic work is a median skin incision whose inferior extremity reaches nearly to the pubis,

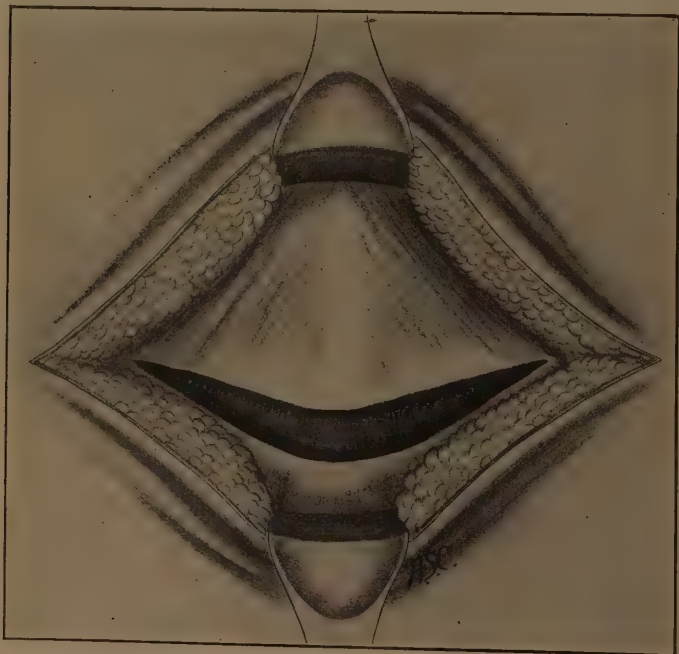


FIG. 259.—Transverse abdominal incision. Incision through deep fascia.

and whose length is in accordance with the nature of the case. It should be made with firm sweeps of the scalpel until the sheath of the rectus is encountered, when a short cut through one end of this is made. This is rapidly enlarged with the scissors, as being less likely to cut underlying muscle inadvertently than the knife. The muscle is split or pushed aside with the closed scissors until the sub-peritoneal fat is exposed.

Occasionally, when the abdominal wall is thin, the linea alba is cut down upon directly and then the knife deepens the incision rather than the scissors.



FIG. 260.—Transverse abdominal incision. The fascia cut transversely, the recti muscles drawn apart, the peritoneum opened longitudinally.

Much dissecting between fatty layers can be avoided if the sub-peritoneal fat is opened with a sharp knife, but care is necessary not to penetrate the peritoneum and injure the intestine. After the peritoneum is exposed, it is caught with a hæmostat

and a sufficiently large fold drawn up to permit the finger to be placed at one side below the forceps. Thus one makes sure that nothing more than a double fold of peritoneum is present over the finger, and this fold may be quickly incised without danger to underlying viscera. At the first nick through the peritoneum air rushes in and the intestine drops away.

The peritoneal incision is enlarged to the extent of that through the muscle, care being taken that the bladder is not injured at the lower end of the incision. In patients with large tumors the peritoneum is first opened at the upper end of the incision, and it is not extended so near to the pubis until the location of the bladder is definitely ascertained. If difficulty is experienced in securing enough room for proper manipulation, the muscles and fascia may be incised longitudinally hard against the pubis, and an additional transverse nick made at the inferior extremity of the pyramidalis muscle. The bladder is in no danger of injury if this incision is no deeper than the internal surface of the muscle. Rarely, it may be necessary to incise one or both recti transversely at a higher level in order to secure room for the separation of adhesions or to get behind a tumor for the provisional control of hemorrhage. In such an event the rectus should be securely attached to its sheath by mattress suture above and below the proposed incision before the muscle is cut, as by so doing retraction of the muscle is prevented and perfect closure is assured. Should it be necessary to extend an incision above the umbilicus, the latter should not be cut through but skirted on one side or entirely removed. Incisions in either the right or left hypogastric region can be made in accordance with those devised for access to the appendix.

HEMOSTASIS

Hæmostasis is effected by pressure with forceps which crush the ends of the vessels, or by ligatures and sutures which occlude them. Crushing gives ample security for very small vessels but it should not be depended upon for anything larger

than muscular twigs, and minor annoyances from post-operative hæmatomata can be avoided if every vessel which spurts is finally closed by a string around it. Imperfect hæmostasis is responsible for more disasters after abdominal operations than is generally acknowledged, many cases of shock being nothing more nor less than post-operative bleeding, and many instances of post-operative sepsis being due primarily to a hæmatoma or hæmatocele which furnished an excellent culture medium. Bizarre methods of controlling hemorrhage by huge crushing clamps like the angio-tribe and by electro-cauterizing apparatus, may be efficient but they are clumsy, unsurgical, and unnecessary, since the ordinary means at our command are perfectly safe and are always available. Heat and pressure are relied upon to check oozing from raw surfaces on which no large vessel is open, both being applied by means of pads wrung out of water as hot as the hands can tolerate momentarily. Oozing in the pelvis, not controlled by the pressure of hot gauze applied for a few moments only, should be met by a gauze pack led out through the vagina. This drains the serum from the blood as fast as it is poured out and promotes coagulation; more than all, it prevents the formation of hæmatomata and obviates the necessity for secondary cul-de-sac incision when the patient should be well on the road to recovery. Persistent oozing from raw surfaces in jaundiced patients, or those in whom for any reason the coagulability of the blood is lessened, is frequently controlled by the subcutaneous introduction of an alien blood serum. Direct and indirect blood transfusion offers one method of accomplishing this, but the subcutaneous use of horse or rabbit serum, which is obtainable commercially, seems to be equally reliable and requires no elaborate technique.

SUTURE AND LIGATURE MATERIAL

For ligatures, silk, linen, and catgut are available, and of these catgut is usually chosen because its absorption is certain

no matter where it is buried, and late extrusion of a sterile plain catgut knot is unknown. It is especially important to use catgut ligatures when drainage or infection is anticipated. So trivial an infection as to do no damage, and give rise to no symptoms, will nevertheless infect a silk or linen ligature and lead to persistent suppuration until it is removed or discharged. The smallest ligature that will afford sufficient tensile strength should be chosen, but the size is not of so much importance in a ligature as in a suture, as ligatures of plain gut are most frequently used, while sutures are often hardened. For tying large vessels in the abdomen, however, slightly hardened gut is preferable to plain, as the peritoneum may digest the gut so rapidly as to permit re-opening of the vessel lumen with secondary hemorrhage as a result. On large vessels a thin silk or linen ligature gives one a sense of security never felt when catgut is used, both because of the certainty that the vessel is properly tied and also because the ligature will not soften.

The same principles apply to buried sutures as to ligatures, excepting that apposition between tissues must be continued longer to assure perfect union. All but the largest vessels are safe after 48 hours, while muscle and fascia require from 15 to 20 days to be restored to a degree of solidity approaching the original. Unless catgut is of extraordinary size it softens much sooner than this, so that gut which is hardened to resist absorption for from 10 to 30 days is chosen for sutures buried in muscle and fascia. Fine silk and linen rarely give rise to trouble in wounds which are perfectly sterile, and again the certainty that they tie right and remain for months has led to their continued use by some operators. As with ligatures, silk sutures give a sense of security that is never felt when catgut is used. This is especially true in post-operative and umbilical herniotomy in which considerable tension is almost certain to exist, but for universal use fine hardened catgut meets practically all the indications. Coarse, over-hardened gut, on the contrary, gives rise to more trouble than fine

silk or linen. It resists absorption almost indefinitely, and the size of the strand is such that it becomes encysted with difficulty and is likely to provoke localized suppuration months after its introduction. There are, however, certain localities in which the indications for a particular suture material are clear. Thus, in repairing intestinal injuries fine silk or linen should always be used, first, because the suture as well as the needle carrying it must be so fine as not to tear or otherwise damage the intestinal wall, and second, because an absolutely reliable suture which will hold for at least five days is necessary. In intestinal resection the inner row of stitches may well be of gut, but the peritoneal row of Lembert stitches should be fine silk or linen. In uretero-ureteral or uretero-vesical anastomosis fine silk or linen should be used for the same reason. In repairing bladder injuries the inner row of sutures should be plain gut as concretions readily form on a non-absorbable suture.

Superficial sutures may be catgut, silk, linen, silver wire, or silkworm gut. On surfaces which are readily sterilized and kept dry, catgut is as good as non-absorbable material providing it is not under tension, but all three of these conditions must be fulfilled if its use is to be satisfactory. Macerated catgut on an imperfectly sterilized surface furnishes an excellent culture medium and frequently gives rise to stitch abscess. Silk and linen are but little better as they absorb and retain moisture by their capillarity.

Sutures which penetrate the skin surface should be non-absorbable and possessed of no capillarity, when there is any tension, when the surface is moist as from drainage, or imperfectly sterilized as about the vulva. It is under these circumstances that silkworm gut and silver wire find their principal use, and of the two silkworm is generally chosen as it is more readily manipulated and tied than wire. Deep tension sutures should be coarse, skin sutures the finest possible.

Catgut sizes: Catgut No. 1 is the size most generally used;

No. 0 is sufficiently small for any use to which catgut can be applied and size No. 2 need never be exceeded.

English twisted silk Nos. 0, 1 and 2 should always be in stock; finer than No. 0, for blood-vessel work can be obtained by untwisting the strands of which it is composed, and No. 2 is large enough for any purpose.

Linen should be chosen in the sizes which correspond to that given for silk, but its numbers are not uniform.

TYING LIGATURES AND SUTURES

Most ligatures are tied with both hands, but the primary knōt in a continuous suture, or repeated knots in an interrupted,

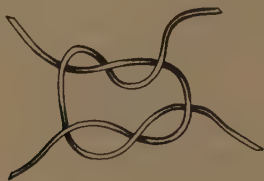


FIG. 261.—“Granny knot.”



FIG. 262.—Reef or square knot.

can be tied with one hand and thus save the necessity for dropping instruments while tying. The “granny” knot, reef knot, triple knot, and surgeon’s knot, all give security when

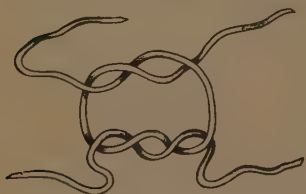


FIG. 263.—Surgeon’s knot.

silk is used providing the ends are left sufficiently long and the knot actually is tied down hard, but the “granny” knot will sometimes slip under tension when catgut is used. It is better, therefore, to accustom oneself to the use of the other forms, of which the reversed surgeon’s knot

is the best if not tied under tension. The first single turn can always be tied down hard and the second double turn will then hold it safely. If there is considerable tension to be overcome, as in suturing the abdominal fascia when the patient is

taking the anæsthetic badly, the first single turn may slip while the second is tying, and here the double turn should be taken first.

The accompanying illustrations show the various knots better than a wordy description. Of the many ways of tying knots with one hand, the best is shown in the illustrations in Monk's article in the *Annals of Surgery*, but rapidly tied, one-hand knots should not be depended upon to control large vessels.

Attention is again called to the great importance of leaving long ends projecting from catgut knots, as the latter untie with great ease when cut very short, and many feet of catgut do not equal one life.

CLOSING INCISIONS

The object of wound suturing is to bring similar parts into apposition and retain them there until the union which has

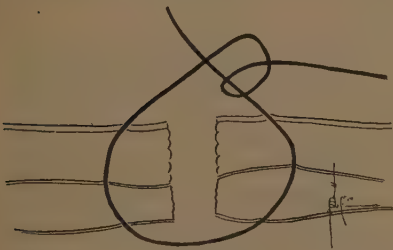


FIG. 264.

Correctly placed through-and-through stitch.

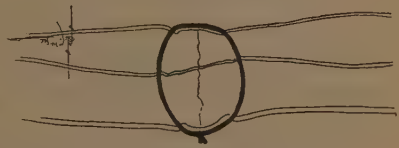


FIG. 265.

taken place is of sufficient strength to prevent separation. Incidentally the obliteration of dead spaces should also be obtained. For this purpose through-and-through sutures taking in all the wound layers, or suture of each layer separately, or a combination of these may be used.

Through-and-through sutures are the more rapidly placed, but owing to defects in their introduction they frequently fail to approximate like structures, and often leave the middle layers of abdominal wounds entirely apart. They should be

used only when rapidity is imperative because of the bad general condition of the patient, and the mid-portion of the stitch should always be farther from the edge of the wound than is its point of entrance or exit.

On the other hand, layer sutures are usually of catgut, and this material is not absolutely reliable under tension. Tension on abdominal stitches is certain to be present during retching and vomiting attacks, as well as when the patient strains in evacuating the bowels. Hæmatomata between the layers of the abdominal wall are common when layer sutures alone are used, as they approximate the edges of the incision but not the



FIG. 266.—Correct placing of a through-and-through stitch.



FIG. 267.—Gaping middle layers of wound after tying incorrectly placed through-and-through stitch.

flat sides of the various abdominal coats. A combination of the layer suture with two or three deep sutures extending through the entire thickness of the abdominal wall, excepting the peritoneum, takes the tension off the wound edges and approximates the layers at either side of the incision. These deep tension sutures should be tied over a gauze roll to provide elasticity and prevent cutting the skin. Through-and-through stitches of necessity are interrupted, but buried stitches may be either interrupted or continuous. Interrupting buried stitches results in burying many knots, and interrupted stitches are less rapidly applied than continuous, so that the latter is usually chosen. In a long wound an occasional knot is judicious, so that the entire layer will not fall apart if the suture material should break in any part of its course. In wounds

likely to become infected, interrupted layer stitches are better than continuous as infection of one stitch does not damage the entire series. This applies especially to abdominal operations in which the incision has been contaminated by the evacuation of pus which of necessity soils the wound. A cardinal point in the closure of all wounds is that *no more tension should be made upon the stitches than is necessary to secure approximation.*

While the tension varies under different circumstances the principle is always the same, and no method of skin sterilization will prevent stitch abscess if tissue is devitalized by the pressure necrosis of a tight suture. Metal clamps for closing the skin edges are popular with some operators and adhesive straps with others, but any advantages they may have are so slight as to be negligible, and both introduce undesirable features—the first, multiplicity of apparatus; the second, uncertainty in sterilization.

DRAINAGE

Surgical drainage is always a moot subject, the fact being that we have no definite knowledge of when to and when not to drain. This is especially true in the abdominal cavity, whose peritoneal coat has a tremendous capacity for absorption and whose serous exudate possesses unknown antitoxic power. The facts that the absorptive power in the individual case is an unknown quantity and that there is no means of estimating the resistance, doubtless lead us to drain unnecessarily. Nevertheless, a properly applied drain does no harm, and an omission to drain may be fraught with fatal consequences. Drainage may be classed in two categories, prophylactic and curative.

A prophylactic drain should be used in a very fat abdominal wall in order to remove serum and exuding fat which may absorb slowly or not at all. Dead serum readily becomes infected, and as asepsis is relative rather than absolute, drainage may prevent abscess formation under such circumstances. A drain to remove blood exuding from large raw areas in the

abdominal or pelvic cavity may likewise prevent infection, as such areas are usually made during the removal of densely adherent structures whose adhesions spell previous infection and whose sterility at the time of operation may be in doubt. The separation of such adhesions almost certainly has damaged the peritoneal coat of the bowel sufficiently to permit the passage of micro-organisms through it, and the abdomen has been open sufficiently long to allow the introduction of many saprophytes whose presence in a dead space full of blood may prove disastrous. On the contrary, drainage is wholly unnecessary when a ruptured tubal pregnancy has left large quantities of blood in the abdomen, because the serous surface is uninjured, adhesions are recent and traumatic in origin, and no infection is likely to be introduced in the short operation needed to remove a bleeding tube. A prophylactic drain may also be placed about, but *not upon*, an injured rectum whose lumen has been opened during the separation of adhesions, if the gut is in such condition that there is doubt whether the sutures inserted for its repair will hold. Prophylactic drainage is wise about areas soiled by virulent pus, infected urine, or fecal matter. In both the preceding examples, not only is the drainage desirable but a cofferdam is constructed between the suspicious territory and uncontaminated areas. The indications for drainage for curative purposes are more easily defined. Pelvic or abdominal abscesses which are opened in order to evacuate their contents need a drain to maintain the patency of the opening. These drains many times should be cofferdams as well, since the pus must flow between coils of non-adherent intestine and the introduction of a tube will not prevent contamination of the free abdominal cavity, even though intra-abdominal pressure does tend to force any material in the abdomen through an opening in the parietes. Such a cofferdam is judicious about the area from which a densely adherent badly infected appendix has been removed, even if no pus is present, as infection and pus are by no means synonymous.

terms. The outward flow of serum through such a drain certainly is safer than trusting too much to the action of the patient's opsonins and leucocytes, as one is in doubt of their efficiency when they permit the infection to occur in the first place.

Finally, temporary drainage of the entire abdominal cavity is possible for a few hours after it has been opened for the relief of diffuse or general peritonitis. Adhesions about the drainage material shut off the general peritoneum within a short time, but the immediate relief of intra-abdominal tension lessens septic absorption and may turn the tide in the patient's favor.

Pelvic drainage may be established through the anterior abdominal wall or through the posterior vaginal fornix.

In a general way and for several reasons that route should be chosen which traverses the least free, uncontaminated, uninfected, peritoneal surface—first, that the material to be removed shall reach its exit most quickly and easily; second, that it shall not infect clean surfaces; and third, that possible adhesions between free coils of intestine may be avoided. It is plain that pelvic abscesses will be drained by an incision through the vaginal fornix, and most ovarian abscesses in the same manner. An abscess in an ovary which is adherent at or near the pelvic brim will, however, be drained through the anterior abdominal wall. Prophylactic drainage, about an infected area or an injured intestine, must be so arranged as to fulfill the indication of being led out through the nearest portion of the abdominal parietes, and practically all pelvic drains will thus pass through the recto-uterine excavation into the vaginal canal. A badly infected or freely oozing surface in the pelvis can be entirely separated from the general abdominal cavity by a gauze cofferdam, upon the superior surface of which the sigmoid colon rests. The gauze composing the cofferdam is led into the vagina by posterior colpotomy

after the abdominal incision is closed, as described under salpingectomy.

The fear of contamination from the vagina is entirely unfounded providing every case of pelvic disease submitted to abdominal incision is at the same time prepared for possible vaginal section.

Whenever possible a drain should have the pelvic wall form one of its boundaries rather than be surrounded by free coils of intestine.

There has been much unnecessary discussion as to the relative value of tube and gauze drains, and the statement is frequently made that gauze does not drain but that tubes do. In order to decide upon the proper form of drain for an individual case, it is necessary to determine what is required of this particular drain. In one instance all that is desired may be an opening in the parietes for a few days, so that possible accumulations may have a line of least resistance through which to escape. For this purpose a small tube, gauze wick, or cigarette drain are each efficacious and the selection is a matter of convenience. In another case it may be desired to empty an abdomen of fluid under tension, and to continue the drainage as long as possible. In such an event a large exit is required with as few adhesions as possible about the drain tract, and an open incision without drainage material may be the method of choice. If something is required to keep the exit patent a large rubber tube would be selected, as it stimulates the formation of adhesions less rapidly than does gauze. Gauze cannot be expected to drain feces, solid particles of loose exudate, sloughs or thick pus, but gauze may well be used to protect the peritoneum about a focus containing such material while a large tube gives exit to its solid or semi-solid contents. Gauze is perfectly satisfactory for draining serous, sero-purulent, or bloody fluid, providing it is fluffed into place instead of being packed and if it does not fill the channel of exit through the parietes. The cigarette drain operates by capillarity only and

it often acts as a stopper rather than a drain because this is overlooked. The discomfort attending the removal of any form of gauze drain can be minimized by enclosing in rubber that portion of it which runs through the incision. Every gauze drain should have its strength tested before its introduction. Re-opening the abdomen has been necessitated more than once because the gauze had been rotted by over-sterilization and tore into shreds during its removal.

Soft rubber tubes should be used in the abdomen in preference to glass, hard rubber, aluminum, or other hard material, as the latter may cause fecal fistula by pressure upon the intestine.

The time for the removal of a drain is dependent upon the purpose for which it was employed. A small prophylactic drain can be taken out as soon as it becomes apparent that it is no longer needed. Tubes which drain pus foci should be removed as soon as the discharge is reduced to an amount for which the drain tract itself is responsible. Large gauze cofferdams should be allowed to remain until they are loose, as their early removal is attended by much discomfort and considerable danger from the rupture of adhesions. This sometimes requires a week or 10 days, but no danger is to be apprehended from their retention unless they become foul, which they will not do if the gauze is iodoformized.

DRESSINGS

The primary objects of a dressing are to protect the wound from contamination, and to keep the wound dry by the absorption of discharge. Incidentally a certain amount of support is afforded by the adhesive straps and bandages which retain the dressings in position.

Dressings to the vulva are applied immediately at the close of operation. They should consist of lightly fluffed loose gauze covered by a large sterile pad containing absorbent cotton, the whole being kept in place by a T-bandage. The coarser the

mesh and the more loosely the gauze is applied, the more rapidly are the vaginal secretions absorbed. Capillary drainage from the recto-uterine excavation into the external dressing is provided by gauze loosely packed into the vagina, its upper end in contact with the abdominal drain, its lower with the external dressings. Abdominal dressings are usually very simple. The wound is covered with dry sterile gauze and the gauze by a pad containing absorbent cotton, all being held in place by taped adhesive plaster and covered with a many-tailed bandage or simple swathe.



FIG. 268.—Abdominal dressing held by taped adhesive. The dressing is not plastered by an air-tight roof.

Abdominal dressings should not be so plastered with adhesive as to make an impermeable covering and prevent the free circulation of air. Such a roof defeats one of the prime objects of a dressing by preventing evaporation and keeping the wound surface moist. Short straps of adhesive, attached beyond the dressings and tied over them by tapes, are neat, can be untied when the dressings are changed, and are economical as well. One long strap running from the trochanters across the pubes may be necessary if the incision extends very low. The abdominal bandage can be kept from rolling up by a short T which is fastened to its lower edge front and back, the vulv

being protected from chafing by a small pad. Drained wounds, especially when free discharge is anticipated, should have an abundance of dressings applied in the first instance, so that the patient is not disturbed during recovery from the anæsthetic. The time and manner of changing dressings are of great importance. Dressings about the vulva should be changed after each urination and defecation, more frequently if saturated. Such dressing is commonly done by the nurse and as a consequence the patient is frequently the victim of poor technique, nurses of good training and masters of technique apparently finding it difficult to appreciate the necessity for the same aseptic attention to the vulvar wound as to any other.

The soiled dressing is removed with sterile instruments—never with the fingers—and the fresh one applied in the same manner after the vulva has been cleansed by irrigating with sterile water, saline, or boric solution, the irrigating fluid being poured directly from a sterile graduate or pitcher.

Re-dressing of clean abdominal wounds is not necessary until the sutures are removed unless the dressing is soiled. The constant fussing with a clean abdominal incision hazards its aseptic condition, and is a source of unnecessary hospital expense. Drained wounds, on the contrary, should be dressed as often as the dressings are saturated, but the wound itself should be disturbed as little as possible.

Dressing technique should be as accurate as operative technique although it may be much less complicated. The dresser should wear sterile gloves in dressing drained or infected wounds unless he is sufficiently skillful to avoid hand contact with any of the soiled surfaces, and whether gloves are worn or not the hands should be carefully scrubbed and dried with a sterile towel. The nurse turns back the bed coverings, unfastens and lays back the bandage and unties the taped adhesive, after which the dresser lays sterile towels about the area and removes the soiled dressing with sterile forceps. Dried blood and serum should not be removed from the wound until the surface beneath

is entirely healed, for both act as efficient protectives. It is rare indeed that the abdominal surface or wound edges need to be washed or otherwise touched with any watery solution, and the habitual use of weak bichloride solutions for this purpose is a delusion perpetuated largely by thoughtlessness. In the strength commonly employed these are not germicidal unless applied for hours, and their habitual use tends to further a sense of security which is by no means justified. Aside from this, the solution bowls in common use about the wards are sure to be contaminated sooner or later and convey infection to a clean wound.

Ten to 20 cc. of alcohol in a small sterile medicine glass furnishes all the "solution" needed to cleanse the skin about the ordinary abdominal incision, and at least it is always sterile. Clean gauze is picked up with the forceps from the sterile draped tray which holds it, fluffed loosely on the wound, and covered with pads as in the original dressing, after which the tapes are tied and the bandage adjusted by the nurse.

AFTER-CARE

Many fine operators achieve but mediocre results, either because of their inefficiency and lack of knowledge in the after-care of their patients, or because their indifference to anything beyond the mechanical completion of an operation leads them to delegate the after-care to inexperienced internes. The first subject to which a surgical interne should turn his attention is the pre-operative and post-operative medical aspects of surgical cases. Instead of this he is more likely to be intensely interested in the glamor and eclat of the operating room, to the detriment both of his patients and himself.

Post-operative care begins the moment the dressings are applied and the patient removed from the table. At this time she should be warmly wrapped in a woolen blanket to prevent chilling, and be accompanied to her room by a competent in-

terne who will see that the head is turned to one side to prevent the inhalation of mucus or regurgitated stomach contents. If necessary the jaw should be kept forward to keep the tongue from falling back into the pharynx and covering the glottis.

From the time the patient is returned to bed until she is completely conscious she should not be left alone for an instant. If there is any appreciable shock she should be kept between blankets and have hot pads or hot-water bags applied *outside* the blankets. If hot-water bags are used they must be absolutely secure as concerns leakage and never be so hot as to burn. While this may seem to be a nursing detail, it is one of those things for which the patient, if not the courts, will hold the surgeon liable if its violation results in a nasty burn. The foot of the bed should be moderately elevated unless the abdomen is septic; in this event the head of the bed should be elevated as soon as the condition of the pulse justifies it. Moderate elevation of the foot of the bed assists in checking oozing from the pelvis, lessens pain by lowering the blood pressure in the elevated portion, and lessens the risk of aspiration of stomach contents during recovery from the anæsthetic. The room should be well aired, but not cold or drafty as much harm is done by the academic conception that the patient needs fresh air. While fresh air is desirable, a blast of cold air from an open window is fairly certain to result in disaster if directed upon a perspiring patient with lowered resistance, whose nasal and bronchial mucosa are harboring pneumococci. So also as regards the patient's clothing during convalescence. Many delicate women, who have been coddled all their lives, must undergo operation, as must others who have never slept in anything lighter than a set of woollens. Although it may be fine hygienic discipline, it is not good sense to subject either class to the cold air cure when dressed only in a light surgery jacket.

Most patients are more comfortable if they remain quietly in the dorsal position without too much rolling from side to

side. If the position becomes irksome they can be gently turned to one side and propped there with pillows. After one or two days any position may be assumed that the patient finds comfortable.

The lips should be moistened frequently with hot water. Cold water and ice are craved, but they inevitably produce more dryness of the mouth by checking the natural secretion. The stomach should be kept empty until the ordinary ether nausea is past. If nitrous oxide has been the anæsthetic, the nausea may not be marked, but there is almost always some nausea after an abdominal operation no matter what the anæsthetic. If nausea persists more than 24 hours, a half pint of warm water may be given at one time. This is sometimes retained and at others rejected, but it washes out the stomach by its return. Cold water and ice usually lead to persistent nausea and vomiting although they are gratifying at the time, but the patient is more nearly normal at an earlier date if they are withheld. Great thirst can be met by the administration of water by the drop method per rectum.

The temperature should be taken per rectum after all abdominal operations, and it should be recorded every four hours during the first three days. Usually it is between 97.5° and 98° for the first few hours and then rebounds to between 100° and 101.5°F . Temperatures considerably higher than this may be noted in patients who are making a perfectly satisfactory convalescence. The pulse should be recorded every hour, and after two or three days every four to six hours. Marked differences in the pulse rate are observed in different individuals. A pulse as low as 60, or as high as 120, need cause no concern if its quality and rhythm are good. A very soft pulse during the first few hours is more significant than its rate alone, and demands investigation.

An uncomfortably fast pulse, without adequate explanation in the abdominal condition, is often due to hyperthyroidism and is controlled by an ice-cap to the neck and another over the

heart. The respiration should be taken as carefully as the pulse but needs recording less frequently; sighing respiration and pallor shortly after an operation mean danger, and a respiration rate which exceeds 30 per minute usually signifies the onset of some pulmonary complication.

After all the instruments of precision have been used, however, one good unbiased look at the patient's face will tell the trained observer more than he can gather from the bedside records.

Very little or no medication is required during the first two or three days after the ordinary gynæcologic operation, excepting such as may be needed for pain. Morphine hypodermatically may be used as necessary unless there is a distinct contra-indication. Such a contra-indication is found in the combination of severe paroxysmal pain with obstinate constipation and vomiting of intestinal contents; under virtually no other circumstances is it necessary to withhold narcotics after operation, the fussiness over the presumed effect on the kidneys and intestinal tract being wholly without a reasonable basis of fact. Morphine does, however, nauseate a considerable number to whom it is administered, and it should be given only for real physical discomfort. "Nervousness" is readily controlled by large doses of bromide per rectum.

The bladder needs careful attention during the first 48 to 72 hours. After any operation, in which the ureter or bladder might have been injured unwittingly, the catheter should be passed before the patient leaves the surgery. Clear urine which is not blood-stained gives assurance that such an accident has not occurred. Over-distension after operations for cystocele and retrodisplacements may entirely nullify the operative result. On the contrary, frequent catheterization must be avoided and if the patient can void naturally she should be allowed to do so. When spontaneous urination is impossible the catheter should be used just often enough to prevent over-distension, which never takes place in less than 8 hours and

is not likely to within the first 24. The secretion of urine during the first 24 hours after an abdominal operation rarely exceeds 500 cc. and may not be more than one-half this amount. Less than 250 cc. in the first 24 hours demands investigation. From this time on the quantity gradually becomes normal, and the bladder should be evacuated three or four times daily which is often enough to prevent discomfort.

In the event that injury to the bladder has occurred, it should be kept empty by a retention catheter until firm adhesions have taken place, when frequent catheterization is taken up in its stead.

When for any reason frequent or long-continued catheterization is required, hexamethylenamine should be given in 10-grain doses two or three times daily, and the bladder may be irrigated once daily while the catheter is in place. It is the introduction of the catheter which causes cystitis and not its presence in the bladder.

That attention to the bowels which is necessary in the after-care of patients who have had plastic operations upon the perineum has been given in the section devoted to that subject.

No attention need be paid to the bowels for the first 48 hours after abdominal operations unless the pelvic colon or rectum have been injured. In this event the anus should be dilated before the patient leaves the table, and a short rectal nozzle inserted and allowed to remain for some days in order to obviate distension of the injured portion and prevent tension upon the sutures inserted for its repair.

If the gut has not been injured, an enema of salts and glycerin $\bar{a}\bar{a}$ 3i, soap suds Oi is administered on the third day, and this is usually followed by the expulsion of flatus. If no flatus is expelled this enema may be followed by a larger one of soap suds. Inability to expel a large enema should lead to the introduction of the rectal tube rather than to repetition of the enema. If the second enema is not effectual, but there is neither vomiting nor marked distension, efforts at

moving the bowels are better discontinued until the next day when a repetition of the above program will produce satisfactory results. If, however, there is distension with nausea and vomiting, an enema of an ounce of alum in a pint of plain water may be given, and when this is ineffectual the rectum and lower colon should be washed out with warm soap suds given through a funnel attached to the rectal tube. This is siphoned off when the patient becomes uncomfortable, and is repeated until several quarts have been used. It is rare that this fails to secure the desired result in the absence of organic obstruction or paralytic ileus.

If the bowel has been injured, small enemas only should be given and they should be introduced without pressure. *Cathartics are contra-indicated if the bowels fail to move by the use of enemas.* Obstruction cannot be overcome but on the contrary is made worse by cathartics, and in the absence of obstruction the bowels sooner or later will respond to enemas.

Bombarding a patient with calomel as soon as she can swallow, in an effort to obtain the early passage of flatus, does the patient no good and is very disagreeable. This practice has no better basis than the nervous apprehension of the operator that obstruction or peritonitis might be present, but surely are not if the bowels move.

No food should go into the stomach until the digestive tract is ready for it. In patients who have had plastic operations this may be on the second day. After abdominal operations a clear soup and orange or lemon albumen may be relished by this time, but neither solid food nor milk should be given until the disposition to tympany has disappeared and the bowels move with no more difficulty than would be expected in a patient who is confined to bed.

It cannot be stated too imperatively that during the first few days after a serious abdominal operation the patient needs all her strength for recuperation, and that unnecessary visiting, bathing, and hair dressing should be interdicted. Every

emotion and every mental effort requires an expenditure of energy which is better conserved than wasted.

The patient should be well past any actual operative or anæsthetic discomfort in 72 hours, and the actual surgical convalescence may then be said to begin.

After this time the temperature, pulse, and respiration should be normal or approximately so, and need be taken but three times in 24 hours.

Ordinarily, too, the bladder is evacuated spontaneously and the quantity of urine is nearly normal. The bowels usually continue to need some attention because of the restricted diet and lack of exercise, and a daily enema or one every second day, alternating with a few grains of cascara, a small dose of magnesia, or 2 to 4 drams of liquid albolene, suffice to keep them in order. The diet should be increased as the patient's appetite dictates; usually she is on the regular house diet at the expiration of a week, and earlier than this if the operation has been of a minor character.

A daily bath, with thorough rubbing of the back, arms and legs, promotes comfort and is a fair substitute for the exercise to which the patient is accustomed.

The time for sitting up varies with the nature of the operation and the physical condition of the patient.

Patients with extensive plastic operations should remain in bed for a full two weeks. There is no danger of their "tearing the stitches" at a much earlier date, but the inevitable stretching of the parts begins as soon as tension of the abdominal muscles increases the intra-abdominal pressure. After a muscle-splitting incision through the anterior abdominal wall, a patient might be up within a day or two without risk to the integrity of the incision, but she would lose more than she gained. After a straight incision sufficient time should be given to obtain a fair degree of strength in the wound, and wounds heal more quickly when at rest. The fad for rushing patients out of bed, as soon as they can possibly sit erect with-

out fainting, has its basis in a deficient sense of the relative value of things. Most patients who submit to an operation care less for the cost of a few days in the hospital than they do for a complete, satisfactory recovery, once they have gone to the inconvenience and expense of having an operation performed at all. No matter how trifling the risk of hernia, nor how slight the danger to life from secondary hemorrhage, there is no gainsaying the fact that the site of incision is more comfortable if no strain is put upon it before it is perfectly sound.

Neither should patients leave the hospital until they are able to care for themselves without inconvenience, and in this respect the home facilities vary so greatly that no set rule can be laid down. After the average abdominal operation a patient should be propped up in bed in 10 or 12 days, be out of bed in two weeks, and leave the hospital as soon after this as the circumstances justify. The little discipline enforced by regular hospital rules is over all too soon for the greater number of patients, whose whole welfare, rather than their wounds alone, should be taken into consideration.

Medication during this period, aside from the occasional laxative mentioned above, should be employed according to the indications. An occasional dose of bromide for a wakeful patient, a bitter tonic for those whose appetite is deficient, and iron for those who are anæmic, are of course indicated.

After dismissal from the hospital the patient should remain under the surgeon's observation for a number of weeks, during which an occasional examination ought to be made and the findings noted on the case history. This not only serves the object of scientific completeness of observation, but it enables one to orient himself as to the efficacy of various methods of operating and acts as a guide to future diagnosis should further trouble occur.

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CHAPTER XX

POST-OPERATIVE COMPLICATIONS AND SEQUELÆ

Shock.—Unless operative hemorrhage has been severe or the patient was in serious condition before operation, shock is an unusual phenomenon in pelvic surgery. While the clinical manifestations of shock are unmistakable, its exact nature has not been determined beyond a reasonable doubt. The symptoms are usually manifested before the patient leaves the table, and consist of a rapid soft pulse, profuse perspiration, cold extremities, lowered blood pressure, and slight cyanosis. Added to these is a markedly sub-normal temperature. After a patient in severe shock has recovered consciousness she often has a clear conception of the seriousness of her condition but is without any great anxiety over the probability of a fatal ending.

Unless shock is plainly the result of traumatism plus operative hemorrhage, its differentiation from post-operative hemorrhage is easy, the air hunger of the latter being conspicuous by its absence. On compressing a finger proximal to the nail, the appearance of marked congestion distal to the point of pressure indicates the absence of hemorrhage, when a condition of profound systemic depression can be nothing but shock.

The treatment of shock must be on an entirely empirical basis until we understand its exact nature. The three most promising theories of shock are, the old one of dilatation of the vessels in the splanchnic area leading to cerebral anæmia, Henderson's, of over-ventilation of the tissues with consequent loss of the normal carbon dioxide stimulation of the respiratory center, and Crile's, of traumatic or psychic over-stimulation, followed by an exhaustion of the central nervous system making itself especially felt in absence of vaso-motor control. The

possibility of anaphylactic shock seems to have been overlooked by observers, but it cannot be disputed, and it may explain some of the unexpected phenomena which follow the spilling of sterile pus; cyst contents, and like protein material in the abdominal cavity.

Shock is more readily prevented, than treated after its full development.

The prevention of hemorrhage, thorough protection of exposed peritoneal surfaces, avoidance of traction on mesenteries and pedicles, gentle handling of all tissue, and local anæsthesia of shock-producing areas, in the order named seem, to be the most important operative precautions in preventing and minimizing shock.

Prolonged anæsthetization undoubtedly contributes in no small degree to the production of shock phenomena, so that time-consuming unimportant details must sometimes be omitted in the course of a serious operation, while they might be entirely in order in a less dangerous one. The use of morphine before and sometimes its repetition in rather heroic doses during operation, is valuable in preventing the onset of shock. Small doses of morphine in the 24 hours preceding a grave operation certainly are of value in the prevention of unstable nervous equilibrium brought about through the influence of the mind.

Certain measures, which are of unquestioned value in the treatment of well-developed shock, combat symptoms that are the phenomena of depression, and among these the most important are the ones which seek the restoration of body heat. If the surface of the body is thoroughly dry, heat dissipation is lessened, and the external application of warmth acts in the same manner. The patient, therefore, should be thoroughly but quickly rubbed dry and wrapped in woolen blankets to prevent evaporation, while hot pads or hot-water bottles are applied outside the blankets. The intravenous use of 1 per cent saline solution is of great value, and the subcutaneous use

of the same solution is equally good although less prompt in its action. Hot saline per rectum by the drop method may be used instead of the others where the necessity is less urgent. If there is actual collapse with imperceptible pulse, the head should be lowered to prevent fatal syncope and 10 drops of adrenalin solution be added to the intravenous saline. Direct transfusion of blood combats shock in a wonderful manner when hemorrhage has been a contributing factor, but it should not be used to the exclusion of the above measures which can be carried out while the arrangements for transfusion are being made.

After the full development of shock, morphine in small doses acts well in case it has not been used previously, but if the patient has been thoroughly narcotized preceding or during the operation it is of doubtful value.

Other drugs frequently used are strychnine, alcohol, atropin, and digitalis. All of them seem to be useful at times, and at others to be useless or actually harmful.

Strychnia is used much too frequently. A single large dose is of apparent value in collapse, but short of this condition it does no good whatever. Digitalis acts very slowly, but Cloetta's digitoxin as dispensed in the solution known commercially as "Digalen," can be given intravenously, and one maximum dose of 1 cc. of the solution sometimes braces a failing heart in a remarkable manner.

Patients with cold extremities, who are sweating profusely and seem to be thoroughly dehydrated, are sometimes benefited by a single hypodermic of atropin, while the use of alcohol is wholly a matter of guess work.

Post-operative Hemorrhage.—Hemorrhage after operation is of two forms, the old time secondary hemorrhage due to sloughing being seen so rarely as to be negligible. The first is continuous oozing from large denuded areas, the second is bleeding from an overlooked or poorly tied vessel.

Oozing is not dangerous unless the constant small blood loss

takes place in a patient previously exsanguinated, when it may turn the scale against recovery. Both serious oozing and free hemorrhage are more likely to occur in patients who were operated upon in the high Trendelenburg position, and who at the same time suffered considerable reduction of blood pressure. Oozing may seem to have ceased completely and fairly large open vessels may be overlooked because they do not spurt, but hemorrhage takes place after the patient is returned to bed with her pelvis lowered.

The symptoms of serious post-operative bleeding are plain; constant diminution in the pulse tension, usually but not necessarily with increase in the rate, increasing pallor, blanching of the visible mucous membranes, restlessness, air hunger and inability to see plainly, all point to bleeding, and the differentiation from plain shock is made by noting the color under the nail when the return circulation is cut off by pressure on the dorsum of the finger just proximal to the nail. Quick increase in color means shock; no increase means hemorrhage. In drained cases the blood makes its appearance externally in sufficient quantities to render the diagnosis easy. If there is real doubt, and the abdomen is closed, some stitches may be removed or the posterior vaginal fornix opened under local anæsthesia.

The character of the operation will generally indicate whether simple oozing or severe bleeding is present. If an old pyosalpinx with dense adhesions has been removed and all vessels ligated, but the oozing from raw surfaces was free and controlled with difficulty, the probability is that oozing has recurred.

If a huge fibroid without adhesions has been removed, and the symptoms above noted make their appearance a few hours later together with very severe abdominal pain, there is no doubt that a large vessel is bleeding.

Treatment.—The foot of the bed should be elevated at once not so much to prevent syncope, which might prove fatal, but

is more likely to be conservative, as to lower the blood pressure in the pelvis. Neither blood-pressure raising nor vaso-dilating drugs should be given until the bleeding is under control. If nothing more serious than oozing is taking place this elevation together with ice-bags over the pelvis may prove sufficient. The injection of alien serum hypodermatically or direct blood transfusion may be safer than re-opening the abdomen, but if things look very serious the patient should be transfused and re-operated simultaneously, and the oozing surface tightly tamponed. It is needless to say that such a secondary operation must be done speedily and with a minimum of anæsthetic. Ether should be given because it is less depressing than chloroform and allows of more rapid operating with less traumatism than does nitrous oxide. After oozing is controlled by a second operation saline solution may be given subcutaneously or intravenously, but hot saline per rectum should be avoided as it is likely to start the bleeding anew.

If the bleeding proceeds from a large vessel, nothing is likely to succeed short of re-opening the abdomen and clamping or ligating the bleeding point. This being true the sooner the secondary operation is begun the better. While speed is necessary, the aseptic technique should be as accurate as the original operation and the work go on just as methodically. The stitches are removed, clots rapidly sponged out of the pelvis, and the cardinal vessels supplying the region investigated in turn. When the one at fault is discovered it is at once clamped and quickly tied. If for any reason tying would consume too much time the clamp may be left in place, and the abdomen rapidly closed around it by through-and-through suture. There is now no objection to the use of any or all avenues for refilling the vessels, and intravenous, subcutaneous, or rectal saline may be given according to the exigencies of the case. In this connection it is to be remembered that saline solution does nothing but restore the blood pressure and bring up the body temperature, and that there is a limit to the

quantity which can be given with impunity. Pulmonary œdema, acute dilatation of the heart, and salt retention with generalized œdema, have all been observed in cases in which saline was used too freely.

Severe post-operative hemorrhage following amputation of the cervix is not an uncommon occurrence. This can usually be managed by tight packing, and always by the insertion of a deep suture on the bleeding side, just lateral to the cervix. Serious hemorrhage following perineorrhaphy is rare, but should it occur it is easily met by suture or ligature. Serious oozing from the abdominal incision and abscess walls sometimes follows operation upon long-standing pelvic and appendicular abscesses. This should be met by serum injection and pressure applied by packing. As the bleeding area opens upon the surface and is usually walled off from the general abdominal cavity there is no objection to the use of styptics, such as adrenalin and anti-pyrin solution, upon the gauze used for packing.

POST-OPERATIVE INFECTION

Infection of Incisions.—Infection of the cervix, vaginal walls, and perineum are among the rarest of post-operative complications. The evidences of infection are usually plain but depend somewhat upon the infecting organism. Should this be the streptococcus there will be elevation of temperature and pulse, local swelling heat and redness, with perhaps a thin sero-purulent discharge from the wound. There is a likelihood also, that by continuity of surface or lymphatic and venous connection, involvement of structures other than those originally invaded will occur.

Should staphylococci or colon bacilli be the infecting organisms, the general reaction is the same but the infection is not so likely to spread. Local suppuration and abscess formation, with foul-smelling pus if the colon bacillus is present, will probably be the end of the matter.

Infection of the abdominal wall proceeds according to the same general plan, streptococcus infection giving rise to a spreading erysipelatous inflammation, the other common pus-producing organisms to a local abscess. Simple stitch abscess is generally due to infection by the staphylococcus albus of the skin, plus a tight suture which has caused tissue necrosis and so furnished the proper culture medium. Hæmatomata between the abdominal muscle layers often become infected when the living tissues would offer adequate resistance to the mild infecting agent. A common source of abdominal wall infection is carelessness in handling the appendicular stump when the appendix is removed through a median incision. With this incision it is sometimes impossible to draw the cæcum entirely out of the abdominal cavity, and in consequence the stump of the appendix is rubbed against the sides of the incision unless the latter is well covered with pads previous to severing the appendix from the gut.

Treatment.—The parts being at rest, free drainage is the first essential, and to this end the stitches in the infected area should be removed and the edges of the incision separated if necessary. Fortunately, the inflammatory process is likely to be confined to the tissue of lowest vitality, which is the subcutaneous fat, and when this is true the integrity of the incision as a whole is not jeopardized. Should the infection result in a localized abscess, drainage is all that is required, although the discharge will not entirely cease until any suture material that has been soiled is either removed or comes away spontaneously. If there is considerable inflammatory reaction with a red brawny swelling extending some distance from the wound, more vigorous measures are demanded. The stitches should be removed, or the incision opened, and a culture taken, both for diagnostic purposes and for the preparation of a vaccine should the latter prove necessary. The wound should be gently sponged dry and then swabbed with full strength tincture of iodine as the germicide most likely to destroy superficial micro-organisms

without lowering the resistance of the tissues. Moist dressings of 2 to 4 per cent. saline solution combined with $\frac{1}{2}$ or 1 per cent. citrate of sodium should be applied constantly according to Wright's proposal. The strong saline solution causes exosmosis, while the sodium citrate keeps the albuminoids in solution, and both together tend to promote constant drainage from the tissues into the wound. If the inflammatory process does not subside promptly, an autogenous vaccine should be made, and at the same time citric acid may be given internally in accordance with Wright's views concerning its efficacy in lessening the coagulability of the blood and so allowing the antibodies to penetrate nearer to the actual focus of infection.

After a day or two of saline dressings the wound sometimes becomes quite painful, when a 10 per cent. alcoholic solution of boric acid will be found useful as an alternative. It is needless to say that the dressing of such cases must be done with great care, and all utensils be kept separate from those used for other patients. The soiled dressings should be cremated immediately. The ease with which infection is carried to an entire ward is shown by the persistence with which bacillus pyocyaneus infections cling to a hospital division. The transference of this infection is never in doubt, since the blue pus which appears first in one case and then in another, makes its spread recognizable to the naked eye.

Peritoneal Infection.—Infection of the peritoneum, introduced from without at the time of operation, is virtually unknown under modern aseptic methods, but post-operative peritonitis always will exist owing to occasional intestinal injury during the performance of a difficult operation complicated by the presence of many adhesions, and to the possibility of contaminating normal peritoneum during operations upon infected fibroids, gangrenous tumors, and pus tubes not yet sterile.

Elaborate attention to details, the walling off of uninvaded peritoneal surfaces, and close attention to intestinal injuries together with drainage when necessary, prevent all but

a very few, but now and then a case will develop regardless of all precautions.

Post-operative local peritonitis is manifested by the same set of symptoms that are present in local peritonitis when no operation has been performed; pain, tympany, elevation of temperature, and the development of a mass, being the most significant. As a rule there is no difficulty in making a diagnosis when the nature of the preceding operation is taken into consideration.

The more dangerous forms of diffuse and general peritonitis which follow operation, present symptoms similar to those following visceral perforation and other primary causes of peritonitis. In the worst types there may be little or no elevation of temperature and few local symptoms, but the pulse is progressively worse from hour to hour, vomiting is persistent, and the patient succumbs to the infection within two or three days of its onset. Other cases are not so rapidly fatal and there is some effort at reaction. The temperature and pulse both rise, vomiting while persistent is not constant, there is abdominal pain and the distension may be enormous, while rigidity is pronounced over the entire abdomen.

Treatment.—In the worst cases of post-operative *general* peritonitis treatment of any sort is unavailing. The patient presents the facies of a fatal illness from the outset and nothing stays the progress of the disease. In milder forms of post-operative *diffuse* peritonitis, the mere insertion of a large drainage tube, together with the sitting posture, constant rectal infusion, and absolute prohibition of food and drink by the mouth, may assist in localizing the infection before it has invaded the entire abdomen. Morphia may be given in sufficient doses to control peristalsis and pain *after the diagnosis is established*.

In purely localized infections peristalsis must be controlled and cathartics be absolutely avoided. The appearance of a mass should lead to a constant watch for the formation of

pus, which should be evacuated through the original incision if this does not involve drainage between free coils of intestine. If the abscess points toward the vaginal fornix it can be opened under local anæsthesia. If drainage was used at the original operation the abscess may rupture into the drain tract, but one should not wait too long for this to occur lest rupture into the free abdominal cavity take place with a rapidly fatal outcome.

Post-operative Intestinal Obstruction.—Intestinal obstruction following pelvic operations may be early or late, partial or complete. It may be due to incarceration of a loop of gut under an old band of adhesions or through an opening accidentally made in the omentum or mesentery, or it may be due to kinking of a coil of intestine which has become adherent to a raw area left by the operation itself. Paralytic obstruction is not true obstruction, and is due either to too much handling of the intestine, traction on its mesentery, or most frequently, to peritoneal infection.

True obstruction is manifested by persistent vomiting without elevation of temperature, and by *rhythmic* abdominal pain associated with visible or audible violent peristalsis. Tympany gradually becomes pronounced and coils of distended intestine may be visible if the abdominal wall is thin. Vomiting is more marked the higher the obstruction, the bowels are obstinately constipated, and flatus is expelled in small quantities and with great difficulty. If obstruction is complete, the bowels refuse to move altogether and no flatus is expelled after that portion of the bowel below the obstruction is emptied.

The striking features of post-operative obstruction are: the transition of ordinary post-operative pain into colicky rhythmic attacks, refusal of the bowels to move with enemas, violent peristalsis, vomiting which becomes intestinal if the obstruction is high, feculent if it is in the large intestine, all at first with a normal temperature and a pulse rate in proportion to the shock which the obstruction is causing.

Treatment.—The treatment must be prompt in proportion to the severity of the case. Delay in a bad case is absolutely fatal. If obstruction is suspected no morphine should be given until the diagnosis is made and the treatment decided upon. Cathartics are positively contra-indicated. They may at any time convert a partial into a complete obstruction by causing the accumulation of gas and liquids above the point of narrowing, with resulting torsion of the gut upon its mesentery.

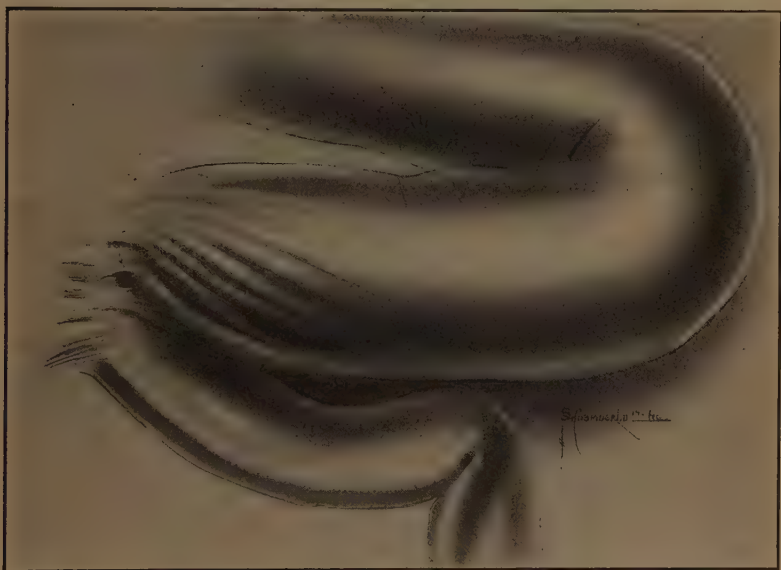


FIG. 269.—Manner of production of complete intestinal obstruction by torsion of proximal limb due to use of cathartics.

If the symptoms are very mild a little temporizing with enemas and stomach lavage is allowable in the hope that the intestine will straighten itself, but too much procrastination may see the patient beyond the possibility of recovery.

There is nothing in all surgery which taxes the courage and surgical resources more severely than an operation for intestinal obstruction soon after a difficult abdominal operation, but there is no alternative.

The abdomen is re-opened through the original incision if that has been made above the pubis; otherwise an incision is made which will most readily give access to the operative field. As soon as the abdomen is opened the most distended portion of the intestine may appear in the incision, and if it does not it should be sought at once. In running over the intestinal coils the paler, less distended loops, invariably are farthest from the seat of constriction; the more distended, fuller, and congested the bowel, the nearer is one approaching the site of obstruction. When the constriction is reached, one may find to his great relief that recent adhesions can be separated readily with the finger even if they are entirely out of sight. Great gentleness is necessary at this time or the thinned out intestine may tear or give way at the point of constriction. Should the adhesions be dense there is nothing to do but expose them fully, as the likelihood of serious injury to the bowel is great, and separation of dense adhesions without the aid of the sight may result in a laceration of the intestine and an immediate fatality. Having relieved the obstruction, the damaged intestine is brought entirely outside the abdomen for inspection, when two points will demand consideration, viz., first, the condition of the constricted area itself, and second, the apparent damage to the intestine above the constriction. Upon the first of these is determined the next step, which may be to return the intestine to the abdomen without further interference, to over-sew a suspicious area before returning it, or to resect the entire involved loop. Upon the second, one decides whether to evacuate the proximal loop before returning the intestine to the abdominal cavity.

Rapid return of the circulation in the involved loop, purple or even black discoloration at the site of the constriction, if the peritoneum is still smooth and the tonicity of the muscular layer is not destroyed, mean that the damaged intestine will return to normal without perforation, and the abdomen should be closed as speedily as possible.

A doubtful condition of the intestine, if the patient were in poor shape for further operation, would lead one to lay the suspected coil upon the surface of the abdomen or just beneath the incision and pack around it, so that perforation would not lead to general soiling of the peritoneum. A very narrow ring which seems likely to become gangrenous can be over-sewed with



FIG. 270.—Intestinal obstruction. Oversewing a narrow ring which might become gangrenous and perforate.

Lembert stitches in such a manner as to turn the suspected portion into the interior of the intestine and so obviate soiling should the damaged area give way. A very bad condition of the intestine, signalized by grayish discoloration and loss of peritoneal luster, demands resection if the damaged gut can be drawn outside the abdominal cavity.

INTESTINAL RESECTION. END-TO-END ANASTOMOSIS

The whole incision and all exposed intestine should be covered with several layers of dry pads, and the intestine be *doubly* clamped at each end of the loop to be removed. The clamps proximal to the gangrenous area should be placed far enough away to take in any ulcerated mucosa which is visible from the exterior of the gut.

The clamps which are placed on the portion of the bowel to be removed may have bare jaws, but those which will remain



FIG. 271.—Intestinal obstruction. Gangrene. Resection. The intestine is doubly clamped at each end of the loop to be removed.

on the ends which are to be joined should be covered with rubber tubing.

The intestine, between the pairs of clamps at each end of the damaged loop, is now cut somewhat obliquely, so that the margin of the intestine opposite the mesentery is not deprived of its blood supply. The cut ends are sponged clean, the loop to be removed thoroughly wrapped in a towel, its mesentery clamped and cut between the forceps and gut, and the resected portion

at once disposed of. The mesentery is quickly tied with suture ligatures and the ends of the intestine brought together and united with two rows of continuous stitches, an inner hæmostatic and tension row, and an outer for the approximation of the serous surfaces upon which approximation intestinal anastomosis depends for its safety. Suturing is sometimes easier if the ends of the cut intestine are caught with a temporary stitch on their free margin, thus allowing the sewing to be

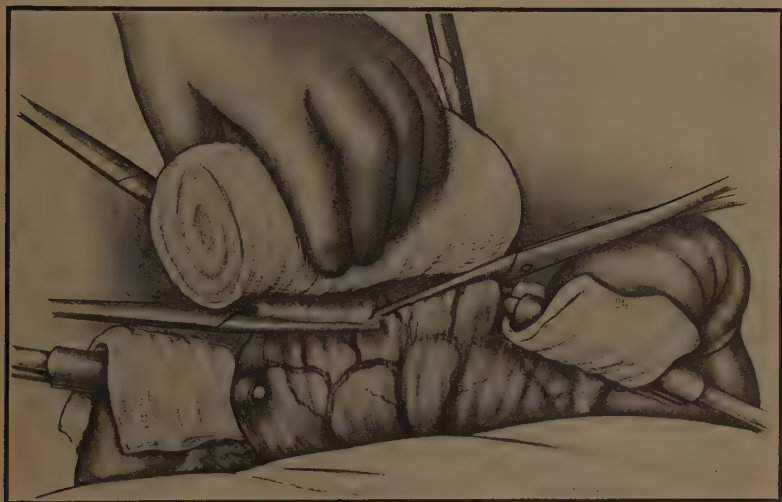


FIG. 272.—Intestinal obstruction. Gangrene. Resection. The involved loop has been severed at each end. The mesentery is being clamped. Note gauze protection of all exposed mucosa.

done in halves, but this is not necessary if the clamps are properly placed. Leakage after intestinal resection is most likely to occur at the mesenteric margin of the gut in which locality it is not covered by peritoneum, and this margin should receive special attention.

The inner stitch of fine chromic catgut penetrates all the coats of the intestine, and it should begin at one side of this uncovered area so that it may not be disturbed by knots. At

its beginning this stitch passes from the mucosa of one side, through all the intestinal coats, and emerges on the mucosa of the other side. It is tied and then continued around the cut edges of the bowel until the free margin opposite the mesentery is reached. It facilitates sewing to tie the stitch at this point and then reverse the needle in such manner as to penetrate from

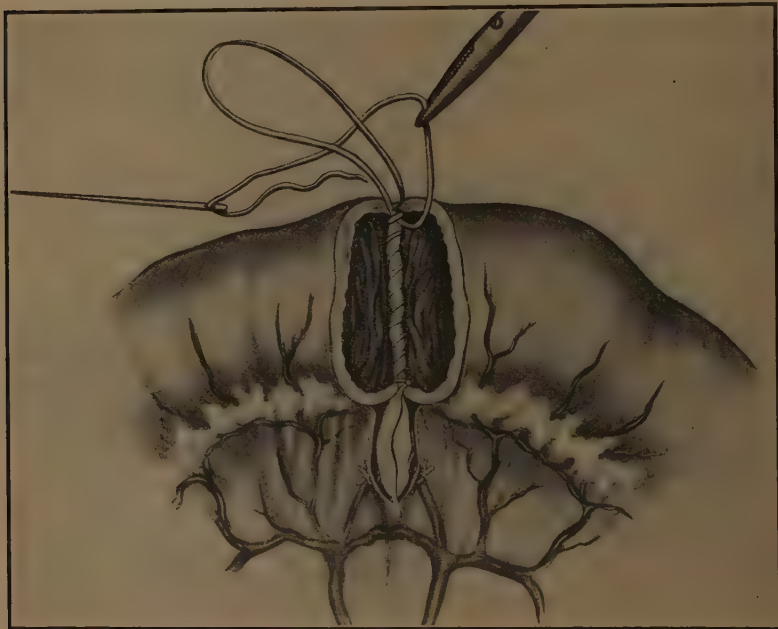


FIG. 273.—Intestinal obstruction. Resection. End-to-end anastomosis. The inner stitch penetrates all the coats of the intestine, and the first knot is at one side of the portion of gut not covered by peritoneum.

the peritoneum of one side through all the coats of both ends and out on the peritoneal surface of the opposite side. In this fashion the cut edges of that half of the intestine sewn last show the margin of the mucosa, and, as Moynihan has pointed out, bleeding is readily seen and controlled if the clamps are removed before the serous stitch is begun. The serous stitch should start on the mesentery proximal to its attachment to

the gut, so that several stitches are passed before the gut itself is reached. Just below the attached margin of the gut the stitch passes through the mesentery to the opposite layer of peritoneum. It then crosses the cut edges of the mesentery and perforates that in the reverse direction, so that a mattress suture is formed which holds the mesenteric layers together as



FIG. 274.—Intestinal obstruction. Resection. End-to-end anastomosis. The anterior portion of the through-and-through inner stitch is completed. The needle takes a turn through the cut edges of mesentery.

well as approximating their cut edges. This stitch is then continued around the intestine in the Lembert fashion, picking up no mucosa in its course. The serous stitches should be close together and turn in a liberal area of peritoneum. With reasonable care there is no danger of forming a diaphragm wide enough to interfere with the fecal circulation.

Having completed the operation, the intestine is thoroughly

washed, the pads removed, all gloves and instruments changed, and the abdomen closed. In intestinal resection for chronic disease it is sometimes wiser to establish an end-to-side or a

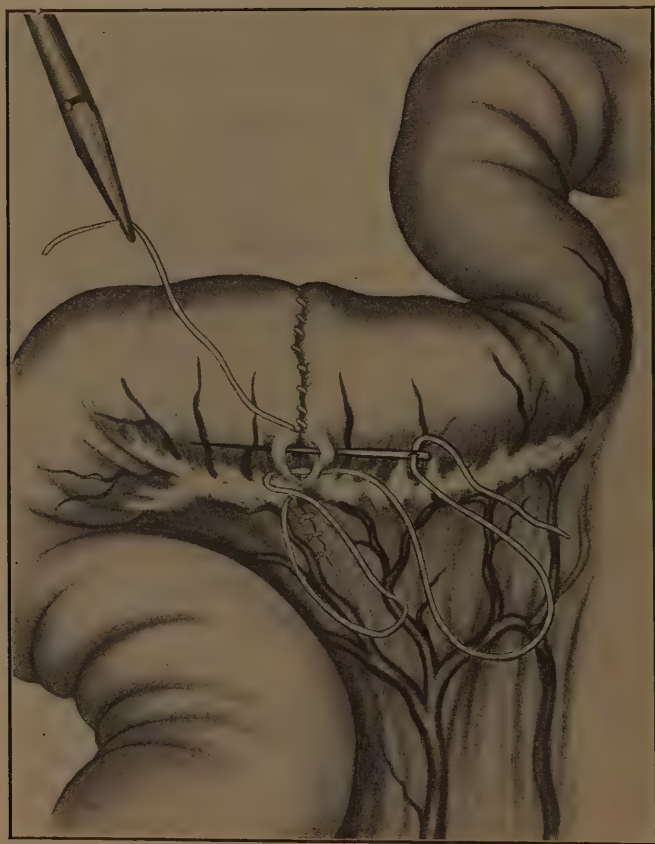


FIG. 275.—Intestinal obstruction. Resection. End-to-end anastomosis. The first or inner row of sutures is finished and the mesenteric gaps closed by catgut stitches.

side-to-side anastomosis rather than an end-to-end joint, but this necessitates more suturing and requires more time, and in post-operative obstruction time is of the greatest value. The Murphy button is often used in anastomosis in order to

save time, but the fingers can do the work as rapidly as the button if the latter is carefully applied, and the uncertainty of the button makes it less desirable than needle and thread.

Whether or not resection is necessary, evacuation of the bowel contents above the constriction is advised, especially if

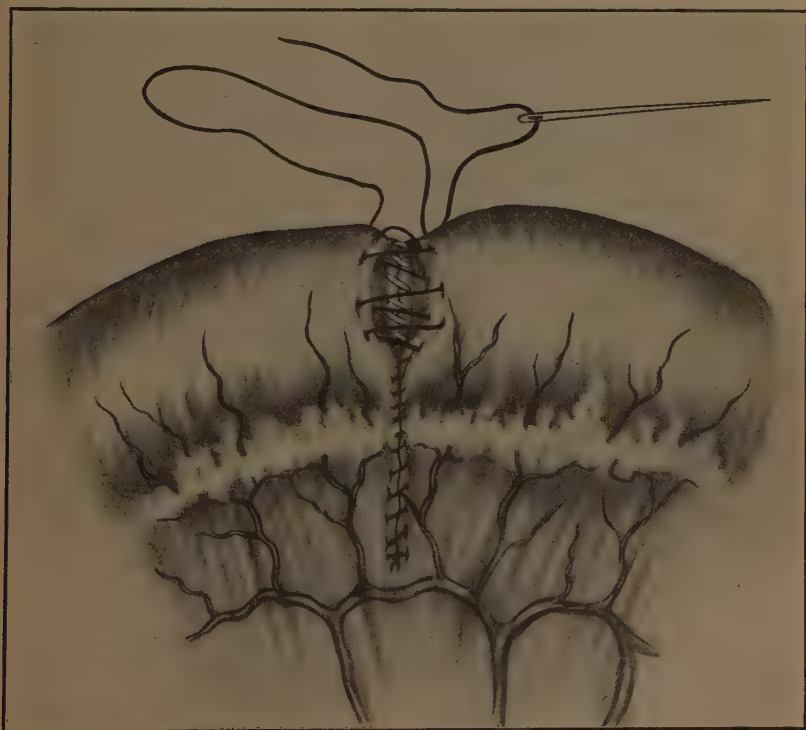


FIG. 276.—Intestinal obstruction. Resection. End-to-end anastomosis. The serous stitch should start on the mesentery. Lembert sutures are shown on bowel, but each stitch should be tightened before its successor is placed.

there is much distension and an ulcerated mucosa. This advice is based on a belief that the healthy gut will absorb so much of the toxic material poured into it from above as to cause fatal poisoning. After trying both evacuation and no evacuation, the author is unable to see any material advantage

and has given it up as a routine procedure, although the weight of authority is in favor of enterostomy with immediate closure of the opening after all the bowel contents are expelled that can be coaxed into the opened coil.

Very recently there has been experimental work which makes it seem possible that absorption of toxic duodenal secretions is responsible for some of the disasters which follow

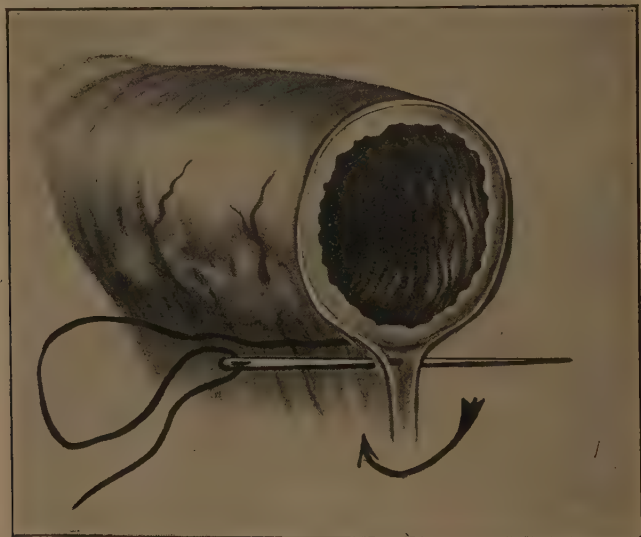


FIG. 277.—Illustration shows portion of bowel wall at mesenteric edge which is not covered by peritoneum. Also how penetrating both leaves of mesentery by mattress stitch narrows this gap.

operation for acute obstruction. Should this prove to be true, a high jejunostomy with temporary drainage of the duodenum may avert some of the deaths which certainly seem to be due to toxæmia.

Two circumstances demand the formation of an enterostomy or fecal fistula. When a search for the obstruction would break up protective adhesions about a badly infected focus a fecal fistula is the lesser of two evils, and if the obstruction

cannot be overcome when found, enterostomy is our only resource.

Only a temporary drainage opening being desired, the elaborate technique which is required when a permanent fistula is to be established is unnecessary.



FIG. 278.—Enterostomy. A temporary opening only is required. Close set stitches uniting peritoneum of abdominal wall to gut. Suspension stitch placed.

Enterostomy.—The most distended loop of bowel is brought up through the incision and a sero-serous approximation made between the parietal peritoneum and gut. The stitches should be so closely and accurately taken that no leakage is possible.

A suspension stitch is taken at each end of the projecting loop, which stitch passes through the skin and subcutaneous tissue and just pierces the intestinal peritoneum and muscle. If the condition of the patient is such that the gut must be opened immediately, a purse-string suture is inserted in the convex border

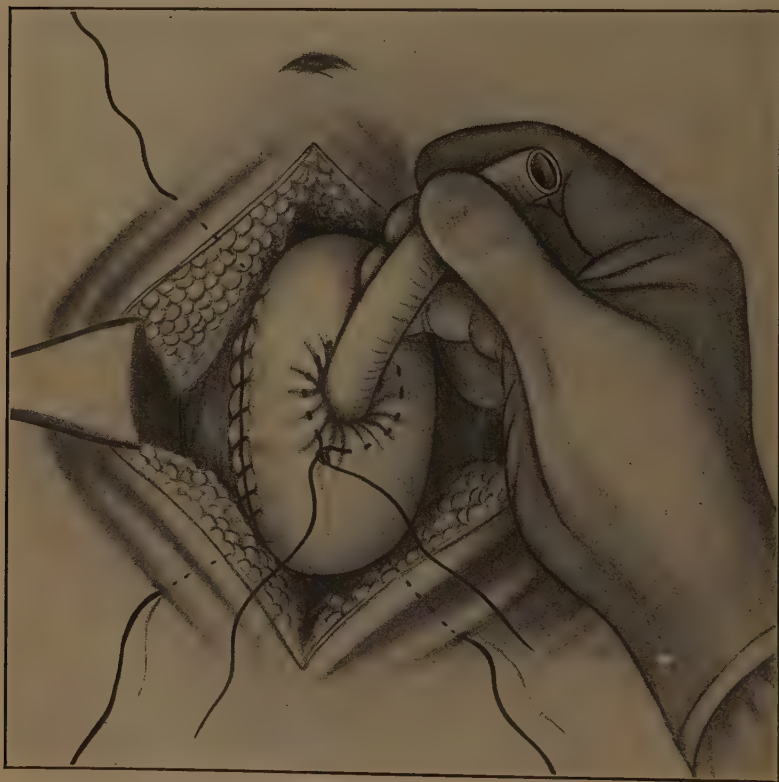


FIG. 279.—Enterostomy. Insertion of purse-string suture and tube.

of the intestine, the abdominal incision thoroughly protected with rubber dam and sponges, the intestine opened, a tube quickly inserted, and the purse string tied. The purse string prevents leakage for a day or two, after which time sufficient adhesions have formed to protect the peritoneal cavity. If opening of

the intestine can be deferred for 24 hours it is safer to do so, when a simple incision with the cautery is made through the convex surface of the protruding loop, to give vent to the retained gas and liquid contents of the intestine.

It is the habit of some operators to establish a fecal fistula for practically all cases of post-operative obstruction, but as this necessitates still another operation of gravity it should be avoided when at all possible.

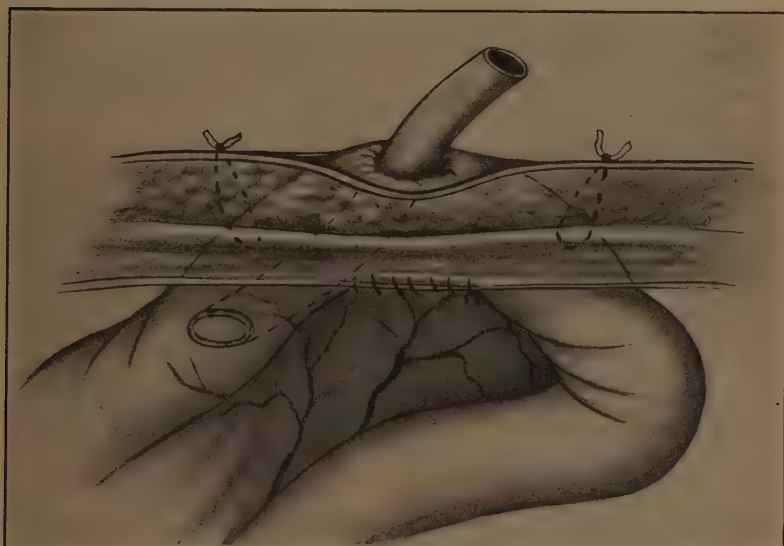


FIG. 280.—Enterostomy. Diagram showing tube in place for temporary drainage of gut.

Fecal Fistula.—Fecal fistulæ follow pelvic operations less frequently in the practice of those who never use drainage. This is not because drainage causes fistula, but rather because intestinal perforation in the closed abdomen is so promptly fatal that fistula does not result.

It must be admitted, however, that the old glass drains did cause an occasional fistula, but soft rubber tubes and gauze do not.

Fecal fistulæ are the result of enterostomy for obstruction, of operative accident, of pre-operative perforation of a pus tube or other abscess into the intestine, or of such damage to the bowel wall that sloughing takes place. Those fistulæ which make their appearance soon after operation are more likely to close spontaneously than those appearing later, as the former are usually due to injury, while the latter are caused by sloughing and actual loss of tissue. Nearly all fecal fistulæ close spontaneously, after a greater or less lapse of time, unless there is some obstruction distal to the opening in the intestine. The symptoms are perfectly plain and consist in the appearance of intestinal contents on the dressings. In fistulæ that are due to sloughs in the intestinal wall, the appearance of fecal matter is sometimes preceded for a day or two by an unaccountable rise in temperature and pulse.

Treatment.—The treatment at first consists of frequent change of dressings and efforts to prevent excoriation of the skin, but if the fistula is high in the small intestine some excoriation will take place in spite of all precautions. Sometimes silver foil applied to the skin in the vicinity alleviates this, and ointments with fatty bases divert the discharge without allowing it to lie too long in contact with the skin. Cleansing of the skin should be done with boric acid or saline solution only, as alcohol and bichloride solutions give rise to unnecessary pain. If the fistula is in the large intestine, the bowels should be kept loose and the drainage tube be retained until it is certain that the fecal matter can escape readily. Some fistulæ close very promptly if drainage is well maintained; others close permanently after several temporary closures which are followed by spontaneous re-opening. If the fistula is permanent it rests with the patient to decide whether its inconvenience and discomfort are sufficient to justify an operation for its cure. Operation is comparatively simple if the leaking intestine is near the surface or adherent to the scar, and extremely diffi-

cult if the damaged bowel is buried in adhesions deep in the pelvis.

If the fistula is short, the involved coil may be cut down upon directly, the fistulous tract excised, and the opening in the gut closed by two or three layers of sutures after the bowel is sufficiently mobilized, which should be accomplished without wide invasion of the free peritoneal cavity.

The operation will rarely be so simple as this, most persistent fistulæ being tortuous and complicated by narrowing of the gut distal to the opening.

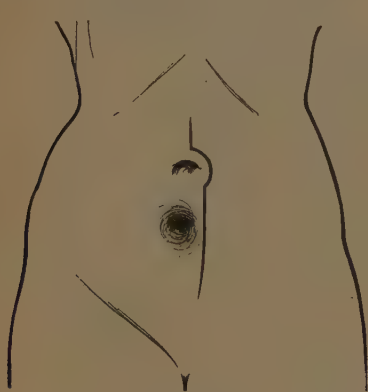


FIG. 281.



FIG. 282.

FIG. 281.—Fecal fistula in midline below umbilicus. Location of skin incision.

FIG. 282.—Fecal fistula. The abdomen has been opened where it is free from adhesions. The incision is prolonged alongside the fistula and the involved coil gradually withdrawn.

In these, the skin should be carefully sterilized, the fistulous tract cauterized at its exit and tightly packed with gauze. The abdomen is then cautiously opened at a point from which adhesions presumably are absent.

Adhesions should now be separated and the incision enlarged *alongside* the fistula until the involved coil is demonstrated, when it is loosened thoroughly and brought outside the abdomen. Sometimes the opening in the bowel is small and can be closed with two rows of sutures over which a graft of omen-

tum is tacked with two or three stitches; at others the whole of the coil will need to be resected to get rid of a narrowed portion, or the opening will be so large and the intestine so infiltrated that simple closure can not be practised.

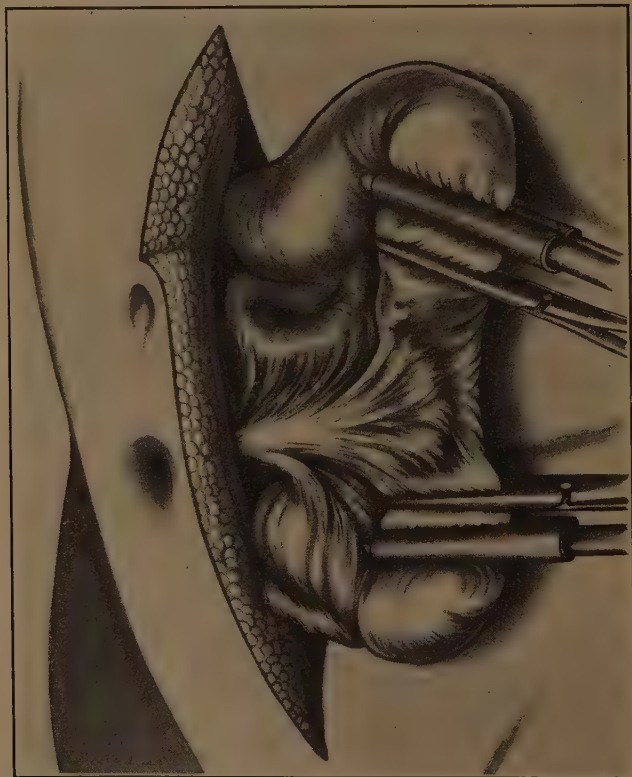


FIG. 283.—Fecal fistula. Resection of involved loop as in intestinal obstruction.

INTESTINAL RESECTION—LATERAL ANASTOMOSIS

When resection must be done the portion to be resected should be removed as indicated under intestinal obstruction, after careful protection of the abdominal cavity, but lateral

anastomosis will more likely be practised than end-to-end. Before this is done the open ends must be closed. This is readily accomplished by a continuous stitch through all the coats just beyond the rubber-covered clamps. This is a hæmostatic stitch, and the stump thus formed is inverted by a continuous



FIG. 284.—Fecal fistula. Resection for. Side-to-side anastomosis. Closure of blind ends beyond rubber-covered clamps.

Lembert stitch which buries it. Rubber-covered clamps are then placed longitudinally on the free margin of the gut near the blind ends, and a continuous Lembert silk stitch applied which approximates the peritoneal coats of the two loops of

intestine close to the edges of the clamps. This suture should be at least 5 cm. in length. Both loops of intestine are then opened 1 cm. in front of the suture line, and an inner layer of fine chromic gut applied which passes through all the coats on both sides. The method of application is precisely the same as for the inner row in end-to-end anastomosis; that is, the first half next the clamp is passed from the mucosa of one side, through the entire thickness of the bowel wall of both sides, and emerges on the mucosa of the second side.



FIG. 285.—Intestinal resection. Lateral anastomosis. Detail of method of inserting Lembert stitch to bury through-and-through stitch.

If this is begun at one end of the incision in the intestine, the stitch is reversed at the other end, so that intestinal mucosa shows along the anterior suture line. Having reached the first end of the incision the suture is tied, and then tied again to the end left when the stitch was begun. After loosening the clamps, the original silk Lembert stitch is continued until it reaches the starting point, and having reached the starting point is tied and then tied again to the end of the suture left at the beginning of the stitch.

The intestine is thoroughly cleansed and returned to the abdomen, and all gloves and instruments are changed for the closure which follows. If there is the least doubt of the integrity of the bowel at the point of anastomosis, a cigarette drain is introduced down to, but not against, the suture line.

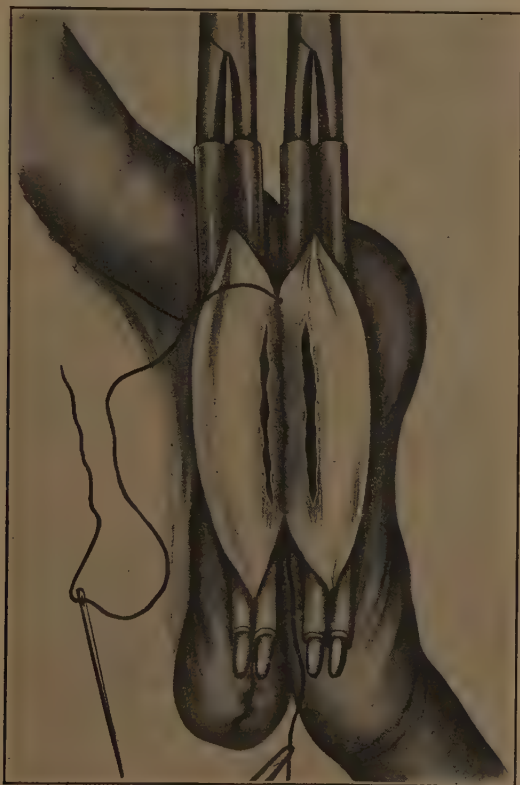


FIG. 286.—Intestinal resection. Lateral anastomosis. Rubber-covered clamps applied longitudinally. Both coils of intestine opened. Posterior Lembert stitch in place.

Lateral anastomosis is generally preferred to end-to-end under these circumstances because the proximal intestine is likely to be distended and hypertrophied while the distal is small and

atrophic, and this disparity in size renders end-to-end union difficult.

Foreign Bodies in the Abdominal Cavity.—It is difficult to understand how and why an instrument can be left in the ab-

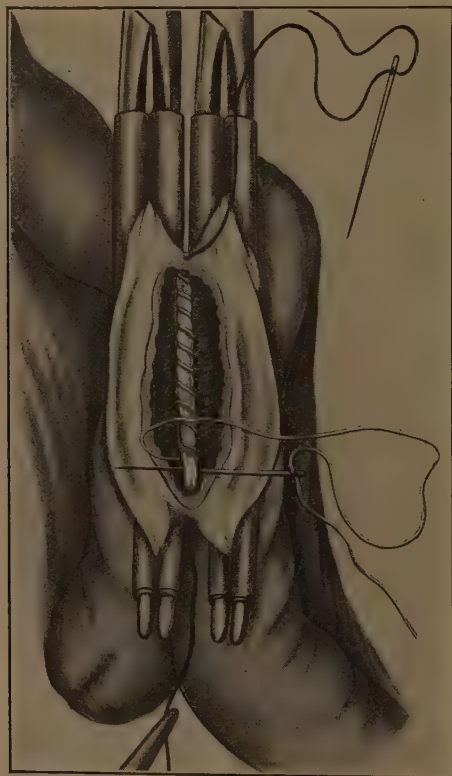


FIG. 287.—Intestinal resection. Lateral anastomosis. Detail of passing posterior one-half of through-and-through stitch.

domen, but this accident or oversight has occasionally happened. It is more difficult to understand why sponges are not overlooked more often than they are, and the comparative rarity of this untoward event is a tribute to the general skill and competence of those concerned in the performance of abdominal operations.

Cigarette drains and portions of packing gauze are sometimes overlooked when considerable drainage has been introduced, and this is best prevented by having the assistant or nurse note on the chart the number of drains inserted, before the

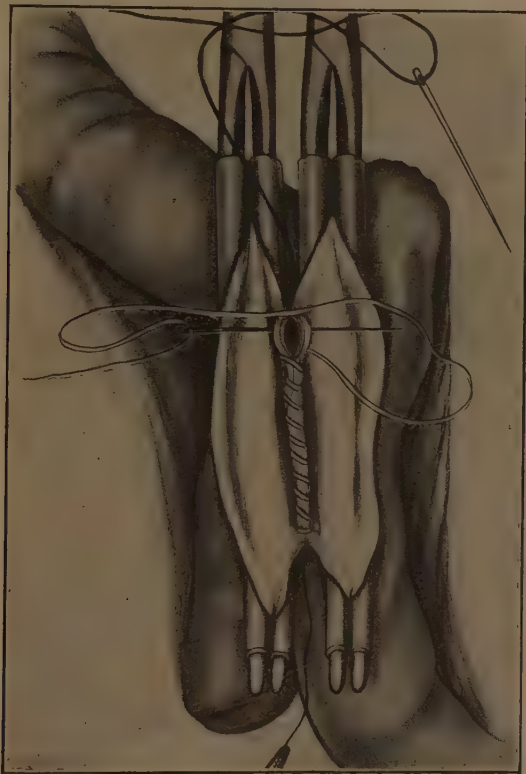


FIG. 288.—Intestinal resection. Lateral anastomosis. Detail of passing anterior one-half of through-and-through stitch. The mucosa is *not* turned in.

patient leaves the surgery. Many methods of counting sponges have been devised in an effort to prevent their loss.

Packages containing a set number to facilitate counting, count of the number used by one nurse detailed for that purpose, metal tags attached to each sponge, etc., have all been tried,

but each presents the weakness of human fallability in the counting.

The use of one or two large sheets acts to prevent the loss of the sheets, but does not prevent the accidental loss of small sponges which may be placed upon the instrument table, or



FIG. 289.—Intestinal resection. Lateral anastomosis. Detail of passing last half of Lembert stitch. The clamps have been loosened.

which were not removed after the abdomen was opened. Very large sheets of gauze are clumsy and sometimes become soiled by contact with non-sterile portions of the gowns and table. Altogether, it seems that duplication of responsibility offers

the best hope of escape from the accident, and to this end the sponges are opened from packages containing a given number, one nurse counts the sponges placed within the abdomen, and one assistant sees to it that each sponge that enters the abdomen has a hæmostat attached. When the assistant recovers all his hæmostats, the nurse her abdominal sponges, and the count of all the sponges in use tallies with the number given out, the element of error is reduced to an irreducible minimum.

A small sterile sponge left in an uncontaminated peritoneal cavity may become encysted and cause but little disturbance. More frequently there are indefinite symptoms which are thought to be due to adhesions and partial obstruction.

The sponge may in time ulcerate into the hollow viscera, or it may become infected and give rise to a localized abscess.

A sponge left in a septic abdomen keeps up a discharge from the drainage opening long after the latter should have closed. Sometimes a mass can be felt, composed of the sponge, exudate, and matted viscera, and at others the foreign body is so far from the abdominal wall that nothing out of the ordinary can be palpated.

When the cause of the abdominal discomfort or persistent discharge is known, the foreign body must, of course, be removed.

Much more frequently a secondary operation is performed upon the diagnosis of partial intestinal obstruction, localized abscess, or imperfect drainage, and the sponge is revealed as an unexpected but very unwelcome factor. There is nothing peculiar about a lesion produced in this manner, and its treatment should be based on general surgical principles after the gauze is removed.

Acute Gastric Dilatation.—This peculiar, but dangerous post-operative complication has been explained in various ways, none of which are wholly satisfactory. The symptoms and diagnosis are plain. Usually within one or two days after operation the patient complains of epigastric and precordial distress, and regurgitates considerable quantities of dark brown

fluid. Coincidentally the pulse becomes quickened and feeble and the patient looks very ill. Inspection of the abdomen shows marked distension of its upper portion, in which the outline of the stomach may or may not be visible. On passing the stomach tube large quantities of gas and brownish fluid are evacuated. A fully developed case of acute gastric dilatation is usually fatal, but patients with lesser degrees recover under prompt treatment. The stomach tube should be passed as often as required to keep the symptoms in abeyance. This may be as often as every two or three hours, or in mild cases perhaps but once or twice daily. The stomach should be kept absolutely empty of food and liquids, all of the latter being supplied per rectum. The patient should be turned on the abdomen and the foot of the bed be elevated. Strychnine should be given hypodermatically in large doses, $\frac{1}{20}$ grain every four hours, until the limit of tolerance is reached as shown by slight stiffness of the neck and twitching of the muscles. Post-operative gastro-enterostomy is certain to be thought of but has been so uniformly fatal in acute dilatation that it is not advised.

Suppression of Urine.—Less than 250 cc. of urine in 24 hours should lead to immediate investigation. Complete suppression, in the absence of the possibility of ureteral injury, usually means an acute nephritis, which leads to profound uræmia and death unless overcome at an early date. Nephrotomy, on patients who have acute suppression, shows an intensely congested organ swollen tightly under its capsule. Measures to relieve the acute congestion are moist heat over the lumbar region, dry or wet cupping, purgation, hot packs, and, most effectual of all, hot colonic irrigation through a two-way catheter, continued as long as possible without exhausting the patient, and repeated two or three times daily. If the case fails to respond to medical treatment, exposure of both kidneys with splitting of their capsules holds forth some hope of recovery. Unless the patient is anæmic, bleeding from the wound

should be encouraged rather than otherwise, and under the same circumstances venesection followed by intravenous saline infusion ought to be of some benefit, and perhaps should have a trial before any radical operation is suggested. If anæsthesia is necessary for any procedure in the presence of acute suppression of urine, nitrous oxide should always be the anæsthetic chosen.

Ligation of Ureters.—One of the dangerous accidents which sometimes occurs during the performance of hysterectomy and ovariectomy is ligation or injury of the ureter. If ligation is bilateral the anuria which results may be mistaken for acute suppression due to nephritis.

Injury to the ureter which causes a leakage of urine into the abdominal cavity may prove rapidly fatal if virulent infection is present, or in the absence of such infection, local peritonitis with abscess formation may take place, the opening of the abscess leaving a urinary fistula.

Ligation of both ureters is followed by uræmia and death within a few days.

Ligation of one ureter, while a serious accident, is rarely immediately fatal. Experimental work as well as clinical experience demonstrates that the usual outcome of unilateral ligation is acute hydronephrosis followed by atrophy of the kidney substance, although infection of the retained urine may occur and cause a surgical kidney. The character of the operation and the anæsthetic used will give some clue as to the probable nature of the accident.

Diminution in the quantity of urine and acute lumbar pain, associated with the rapid development of a swelling in the region of one kidney, is rather positive evidence of occlusion of the ureter on that side.

Total anuria must be due either to acute nephritis or occlusion of both ureters, the latter causing more severe pain than the former.

Treatment.—The recognition of injury to the ureter is rendered easier if the patient has been given a full dose of methylene

blue on the night preceding operation. An injury recognized when it occurs should be repaired at once. If the ureter is completely severed, a uretero-ureteral anastomosis should be performed if possible, or the ureter be implanted in the fundus of the bladder. If both of these procedures are impracticable and but one ureter is involved, it may be brought out on the loin and a urinary fistula established, or the ureter may be securely ligated and dropped. The former is the better plan and can be followed later by a nephrectomy if desired.

If the injury is not recognized until peritonitis has supervened drainage with gauze protection of the uninvolved portion of the peritoneum is indicated.

Ligation of one ureter does not demand interference unless symptoms of kidney infection make their appearance, when nephrotomy with drainage, or nephrectomy should be done according to the necessities of the individual case. Ligation of both ureters might not necessitate interference providing the ligature material used were fine plain catgut. In the event that any other material was tied about the ureters, or upon the slightest indication of any uræmic disturbance, both kidneys should be cut down upon, the kidney opened to its pelvis by a longitudinal incision just posterior to its mid-line, and a drainage tube inserted and allowed to remain until the ligature about the ureters absorb. If the material used for ligature were non-absorbable, these lumbar fistulæ will likely be permanent, and will necessitate the constant use of a double urinary until such time as the patient is strong enough to submit to an operation for anastomosis of the ureters into the bladder.

Post-operative Bronchitis and Pneumonia.—When bronchitis and pneumonia follow operative procedure they are infectious in their nature precisely as they are at other times. The exact manner in which a given operation predisposes the patient to bronchitis is often unknown, but general as well as local lowering of resistance is probably a very important factor. Ether undoubtedly irritates the bronchial mucosa, and the inhalation

of saliva and mucus from the mouth, as well as aspiration of stomach contents into the bronchi, act as predisposing causes if the infecting micro-organism is present. Given a patient with virulent pneumococci in the mouth, nose, or throat, and it is not difficult to understand the onset of pulmonary infection following any of the above-mentioned incidents of anæsthetization. Even without these, the effects of lowered body temperature, exposure to cold when perspiring freely, lessened lung ventilation from inactivity of the abdominal muscles, and possible pulmonary infarcts, may precipitate an attack of bronchitis or pneumonia in persons harboring the necessary micro-organisms.

Add to the above those cases which are coincidences only, and it is not strange that most surgeons have as much fear of respiratory as they have of abdominal complications.

In patients who are septic this risk is materially increased by the presence of micro-organisms in the blood stream, as well as by possible lymphatic distribution from the focus of infection to the lung. Pleurisy of the dry type is not at all uncommon following operations upon any portion of the body.

The symptoms and diagnosis are too plain to need discussion, but a diagnosis of pneumonia often can be made before the physical evidences are present by noting the sudden marked increase in the rate of respiration and the high leucocyte count. The prognosis always is good in pleurisy and bronchitis; in pneumonia the outlook invariably is serious. The treatment of post-operative pulmonary infection does not differ from that of the same condition at other times. The oppression under the sternum which is felt in acute bronchitis can often be relieved by vigorous counterirritation, and the discomfort of pleurisy can be palliated by strapping and the application of the ice-bag. Small doses of morphia, codia, or heroin check the unnecessary cough of the dry stage of bronchitis, and larger doses hypodermatically may be necessary if pleuritic pain is

severe. Altogether only palliation of symptoms is needed, as both pleurisy and bronchitis run a favorable course uninfluenced by medication.

The medical treatment of pneumonia is also symptomatic, and is wholly unsatisfactory so far as any influence upon the course of the disease is concerned. An abundance of fresh air provides sufficient oxygenation in spite of partial pulmonary consolidation, and possibly prevents exhaustion of the respiratory centers through over-stimulation by retained carbon dioxide. Cool sponge baths and ice-bags to the head and precordium certainly promote the comfort of the patient if they do nothing else. Elimination should be promoted in order to assist nature in ridding the body of toxins, and digitalis should be begun early with a view to protecting the heart at the time of crisis.

Whether the various pneumococcic vaccines are of any value remains unsettled, but some method of serum or vaccine treatment may at any time be developed whose efficacy will be undoubted.

Pulmonary Embolism.—This accident is usually fatal. It seems to occur as readily after a clean simple operation as after one which is serious and complicated. Usually a late development, it most frequently is seen when the patient is up and about her room, but why a clot is detached from the operative site, to pass through the veins and right heart and lodge in the pulmonary orifice, is wholly unknown.

The symptoms are startling and tragic in their intensity. There may be no premonitory symptoms, the patient gasping, becoming cyanotic, and dying almost instantly; at other times screaming out with precordial pain, becoming cyanosed, unconscious, and dead within a few moments. Only rarely is the blocking so slight that the oppression and cyanosis continue for several hours before death, and still more infrequently does a patient improve after the onset, and finally recover.

The author once had a patient who lived for four days with precordial distress, cyanosis, and high temperature. The

nature of the illness was in doubt, but the autopsy revealed a small old clot in the pulmonary orifice, to which new layers had been added from time to time until the vessel was entirely occluded.

No treatment seems to be of any avail, although the heroic remedy of opening the thorax and pulmonary artery and removing the clot, has been advised and practised by Trendelenburg and others. In the few cases in which death is not instantaneous this can do no harm, and one can see how it might be worth while in rare instances.

Phlebitis.—The question of whether post-operative phlebitis is the result of stasis, infection, or change in the coagulability of the blood has been much discussed.

Apparently it is any one or all of the three in different cases and at different times. Its appearance in patients with marked varicosities of the veins in the lower extremities is not difficult of explanation, nor is it hard to understand how it occurs in septic patients, but so far it has not been proven to be more frequent in such patients than in others.

This, like pulmonary embolism, is ordinarily a late complication, the first symptom being pain in the calf of the leg, followed by a rise in the pulse and temperature. The leg soon becomes swollen and œdematous and pits on pressure, but the enormous swelling and shiny white skin of puerperal and typhoid phlebitis are not usually seen.

Although rarely of great severity, the acute symptoms may be protracted, sometimes lasting many weeks. The prognosis is good as to life, but a permanently painful, swollen leg may result. In the mild cases swelling and pain after exercise continue from six months to a year.

Treatment.—The first principle of treatment is absolute rest in bed until the acute symptoms subside, the only probable danger being displacement of a poorly organized recent clot.

Elevation of the leg and moderate elastic compression by means of thick cotton padding and a light bandage fulfill the

next most important indication, which is to assist the venous return. Smearing with ichthyol is useless. Counterirritation by means of tincture of iodine applied to the course of the tender veins does no harm and may possibly be of some benefit, and it at least satisfies the patient's demand that "something be done." In view of the apparent efficacy of magnesium sulphate solutions in relieving subcutaneous inflammatory processes elsewhere, it would seem judicious to apply a hot saturated solution of this drug to the entire leg, wrapping the extremity in gauze wrung out of the solution, covering this with oiled silk or protective, and applying sheet wadding and a bandage outside the protective. After all the acute symptoms have subsided gentle massage should be instituted. This may be more vigorous from day to day and should be continued so long as the leg swells persistently. The patient should be provided with an elastic stocking or elastic bandage as soon as she begins to walk, and be instructed to wear it constantly when she is on her feet.

Post-operative Adhesions.—It is axiomatic that all union between peritoneal surfaces takes place through the medium of adhesions. To open the abdomen, remove or replace organs, and secure just the desired amount of adhering surface is obviously impossible. Undesirable and unnecessary adhesions are therefore formed in the peritoneal cavity after its invasion and, temporarily at least, these adhesions form upon any surface which has been abraded or otherwise denuded of its endothelium. If any infection whatever is introduced, even of the mildest type, the number and extent of the adhesions is enormously increased. As the infection subsides many adhesions are absorbed, but bands of some character are likely to be left after the process of absorption is entirely completed.

Fortunately most adhesions give rise to no trouble, but those which render immobile a normally movable organ are bound to cause discomfort. If adhesions bind the intestine to the abdominal wall, discomfort is caused by peristalsis dragging upon

the sensitive sub-peritoneal tissues. It is to be noted that a great mass of adhesions which immobilizes all the organs gives rise to less pain than a few adherent surfaces, and that adhesions which drag upon areas containing few sensory nerves may be entirely painless.

The diagnosis of adhesions is difficult to establish unless their location is such that they interfere with intestinal peristalsis and permanently bind the gut in an abnormal position. Under these circumstances a Roentgenogram by a skilful specialist will confirm the suspicion that persistent post-operative pain is due to adhesions.

When post-operative adhesions immobilize the uterus or ovaries, this can be made out by bi-manual examination, but an exploratory incision is many times the only means of determining whether or not adhesions to other viscera are the source of the patient's discomfort.

Treatment.—Unless the intestinal functions are interfered with, one should not be in too great haste to operate upon post-operative adhesions, as there is no definite assurance that they will not reform. An adherent uterus, fixed in an abnormal location or position, may have its displacement definitely remedied by a suspension or fixation operation which produces adhesions in another locality, and the hope entertained when operation is performed for adhesions fixing other organs is that, although new adhesions are certain to form, they may be more favorably situated and thus be painless. Various methods have been adopted to prevent the re-formation of adhesions when the abdomen is opened, but none of them are on a basis of scientific accuracy. There is no objection, however, to coating the denuded area thoroughly with sterile vaseline, and patients so treated *seem* to have less trouble than those who are not.

Post-operative Psychoses.—The various types of mental alienation which are observed after operation are of two classes. In one the patient was the victim of a latent or concealed

psychosis before operation, and the operative procedure served merely to uncover the mental condition.

In the other the operation itself was in some way more directly responsible for the mental condition, although it is difficult to assume that any operative procedure could be more than an exciting cause, the predisposing factor in the form of unstable nervous equilibrium being a necessary assumption.

Gynæcologic operations are more likely to be followed by psychoses than operations upon other portions of the body because the patient's sexual apparatus is the object of more anxiety than any other, and the fear of the effect of operation upon sexuality, fecundity, etc., is more marked than the fear of deformity or disability.

In addition to this, the premature menopause may be induced by either necessary or unnecessary removal of the ovaries, and so add its own peculiar disturbance to the other etiologic factors mentioned.

The rôle of anæsthesia in the production of post-operative insanity is questionable, but that of infection is undoubted.

Apparently post-operative psychoses belong more often to the class first mentioned; that is, the individual was really a psychopath before operation, and the stress of preparation and operation precipitated a crisis which would have occurred sooner or later in any event. It therefore follows that the patient's mental status should be ascertained before any operation is performed, and operations of election, such as perineal repair for example, had best be avoided if there is any doubt about the mental stability. The great variety of operations, which in the past have been performed upon neurotic or psychopathic women in the hope that cure of the nervous condition would be brought about, have almost uniformly resulted in failure although an occasional brilliant cure has been recorded. On the other hand, operations of necessity should be performed on their own account, but never without the fullest discussion of

the possible result, and preferably only after consultation with a competent neurologist.

Post-operative mental alienation sometimes can be prevented by a thorough frank explanation which is designed to relieve the patient of uncalled for anxiety as to the effect of the operation upon her future, and those crises which are sometimes provoked by the artificially induced menopause, can be obviated by the avoidance of double castration unless the latter is positively demanded, and possibly by ovarian transplantation into the abdominal wall when both ovaries must be removed from their normal location. The unfortunate operative furor, which at one time attacked ovaries the subjects of microscopic disease only, caused infinitely more misery than it ever alleviated.

Post-operative mania or melancholia should be referred to an alienist at the earliest possible moment, the only exception being found in those instances of mania which are directly traceable to the toxæmia of an infection, and which generally recover when the latter is overcome.

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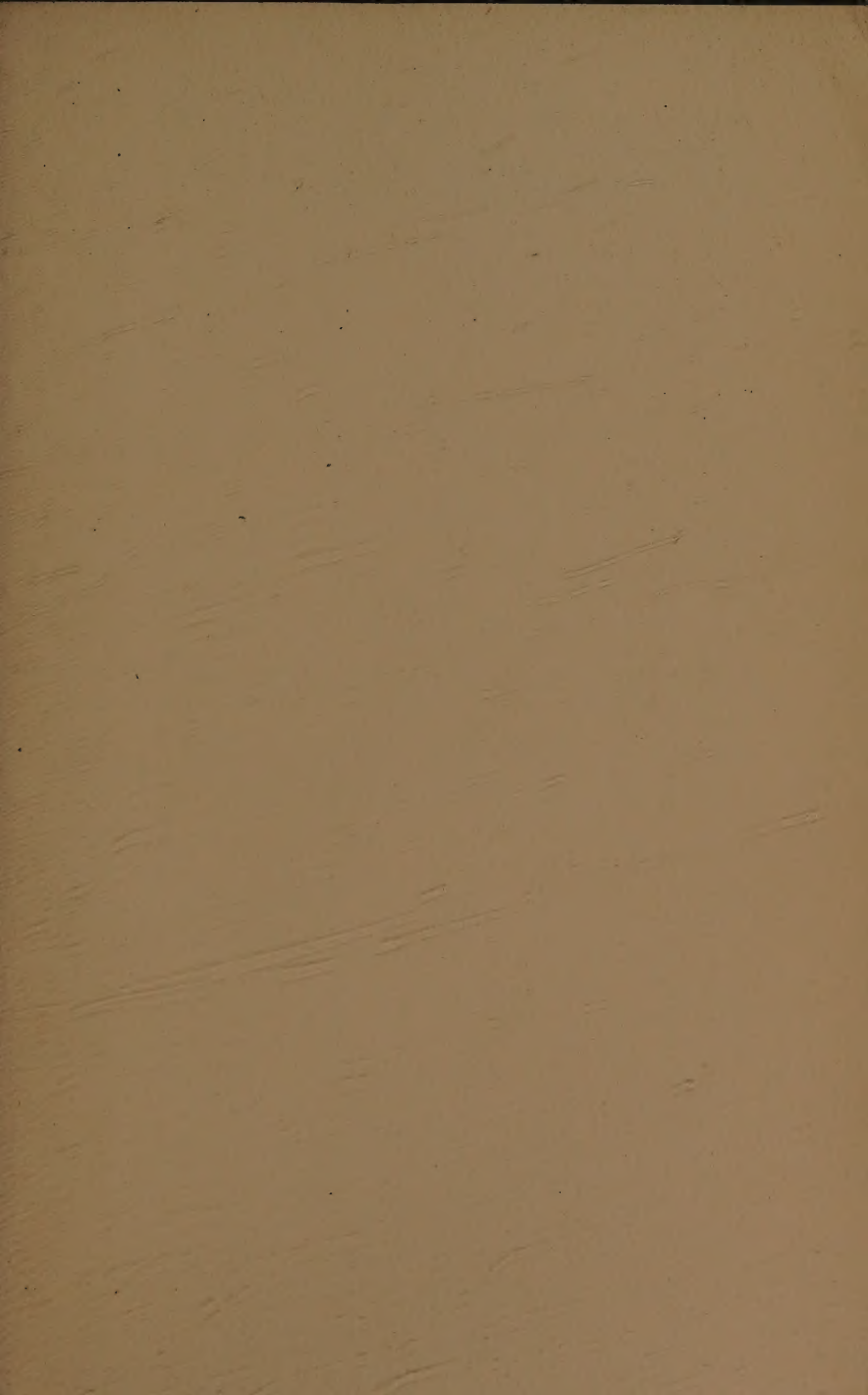
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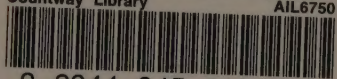


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